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The American horologist and jeweler

Vol. 21 February, 1954 No. 2

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IN THIS ISSUE

FEATURES:

Detached Lever Escapement 15

Hamilton Space Clock 20

Tennessee Sour Mash Clock 56

DEPARTMENTS:

Information Please 22
By W. H. Samelius

Watchmakers' Contest 36

Clockwise and Otherwise 38
By J. E. Coleman

The Watch Repairman and the Oscilloscope 59
By Carl H. Anderson

Jewelry Repairing 74
By R. Allen Hardy

Industry News 80

Advertisers' Index 88

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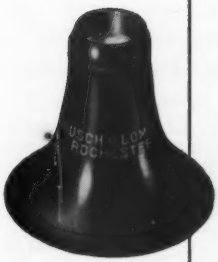

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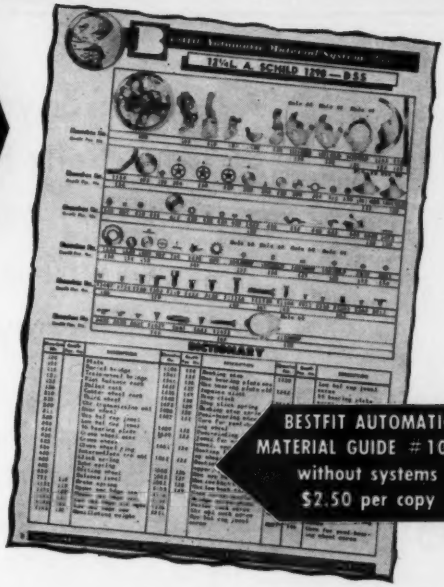

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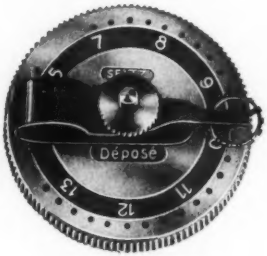

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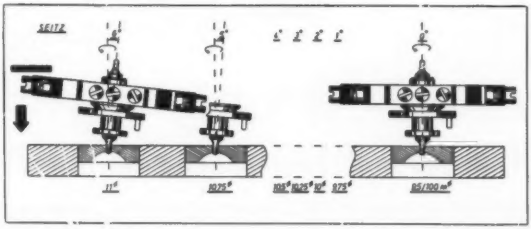

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Detached Lever Escapement

By Chas. T. Higginbotham

WHEN, over four hundred years ago, Peter Henlein of Nuremburg essayed to manufacture watches, the best available device he could find for regulating the motion of the train wheels was a verge escapement carrying a steel balance, to which was attached a piece of catgut, or its motion controlled by a projecting bristle against which one of the arms struck. This crude contrivance was little better than a mechanical toy, comparatively useless as a timepiece. It carried but a single indicator—an hour hand; the minute hand would have been a useless superfluity. It was not until twenty-five years later and the fusee was invented that the minute hand was added. About 150 years after the fusee had been applied the hairspring was invented, and it was now discovered that the verge escapement was too sensitive to the slightest variation in power to be satisfactory as a governing device; still, up to the middle of the eighteenth century nothing better had been devised. In fact, the celebrated chronometer with which John Harrison took the English prize of 20,000 pounds, had an improved form of verge escapement, and it would have been impossible for him to have secured the results recorded had it not been that he introduced a remontoire attachment to the train, which wound the third or fourth wheel at short intervals.

The possibilities for accurate timepieces for use at sea, turned the attention of horologists to the subject of escapements, and many inventions followed each other in rapid succession, many of which have gone entirely out of use. The principal escapements were the cylinder, the duplex, the detent or chronometer and the lever. Of these the detached lever has stood the test and proved itself best adapted to a pocket timepiece. It is this form of escapement to which I desire your attention.

The lever escapement has undergone many changes since its first introduction by Mudge in 1763. In these changes certain fixed principles have been established: The number of the escape wheel teeth has been fixed at fifteen; the extent of the span of the pallets at 3½ teeth; exposed pallets have been almost universally adopted. The lift of the pallets or oscillation of the fork has been fixed approximately at 10° of a circle. The old controversy as to the respective merits of the long and short fork may be considered virtually settled, the roller impulse having been determined at approximately 30°. That is to say, the distance from the center of the balance staff to the face of the roller or impulse pin is about one-third the distance from the center of the balance staff to the center of the pallet arbor. There are, however, still a few points in dispute. I shall endeavor in a fair and impartial manner to present the arguments for and

WAKMANN WATCH WAYS

"Laughter is good for your health"

THE PLEASURES OF BEING PAPA

By Icko Wakmann

There are, in my office building, two longtime friends. Each has taken a new son-in-law into the business. But with what results! "Is my son-in-law stupid!" said one of these men to the other recently, "Look." He opened his office door, called in his son-in-law, and said, "Nick, here's $5. Go buy me a car." The young man picked up the $5—and went!

"That's stupid?" commented the second father-in-law, "Come into my office. See what **real** stupidity is." They stepped across the hall. "Bill," said the second man to his son-in-law, "Go down to the barber shop and see if I'm there." "All right," the young man replied, and out he marched! The two old friends sat down, and shook their heads.

But, in the lobby, the sons-in-law met! "Is my father-in-law stupid!" exclaimed the first, "Oh, how stupid! Just now, he gave me $5 to buy him a car. But does he think to tell me what make?" "**Your** father-in-law is stupid?" sneered the second young man, "Let me tell you about **mine.** Two minutes ago, he sent me down to see whether he was in the barber shop. Couldn't he have **telephoned?**"

That's life! You have to live with what you have. If what you have is good, it's good; if it's no good, it's no good. 2 and 2 make 4! So, Mr. Jeweler, you can sell only the merchandise you stock. If you want merchandise that SELLS, you will stock Wakmann. Two Wakmann specialties will prove this to you quickly: the Wakmann chronographs, and our stop watches.

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DETACHED ESCAPEMENT—Continued

against these disputed points, allowing you to judge of their respective merits.

First, I would call your attention to the question of equi-distance lockings as compared with equi-distance centers. In the former the locking faces of the pallet stones are equally distant from the center of oscillation, which in this case is the center of the pallet arbor, the advantage claimed being that an equal draft is thus secured. To secure an equal impulse it is necessary to form the impulse faces of the pallet-stones at widely different angles, the discharging stone forming the most obtuse angle with respect to the locking face. The disadvantage of this form is that there is a somewhat greater loss of power from sideshake owing to the conditions produced by the impulse of the receiving stone commencing, as it does, at the same distance from the center that the discharge does, but unlike it, approaching the center in receiving its impulse. This loss is in proportion to the diminished distance of the impulse face of the receiving stone as compared with the discharging stone. In the equi-distance center's escapement the center of the impulse faces are equally distant from the center of oscillation. This secures the advantage of an equal loss of power from sideshake. To overcome the disadvantage of unequal draft the stones are set at different angles in the pallet. Either of these forms are capable of excellent results.

Another point of dispute is as to the best form of impulse faces, both for the pallets and for the escape teeth. One method is to make the pallet stone impulse face a perfectly flat plane, and to curve the impulse face of the escape teeth transversly with the face of the wheel. Another method is to curve the impulse face of the pallet stone transversely with the face of the pallet and fork and to make the impulse face of the escape wheel tooth a flat plane. Still another method is to make the impulse face of the escape wheel curved longitudinally with the face of the wheel, the impulse face of the stone being curved transversely. The object of all these forms is to present as small a contact of surfaces as possible—not, as may be supposed, to lessen friction, as friction has nothing to

do with extent of surfaces, but to lessen cohesion caused by oil between the surfaces.

Another disputed point is the table roller as compared with the double roller, and here let me say that the double roller is by no means a new device. We are all aware that it was in use some time ago, but it is not generally understood that the earliest lever escapements were of this type. In considering the merits of the two devices it must be remembered that the guard pin and roller action is entirely one of safety. It is a misuse of this action to employ it for the correction of other errors that may exist in the escapement. A correctly-designed and properly-adjusted escapement will produce just as accurate results as to time without as with safety action. In ordinary use if the escapement is so designed and adjusted, the guard pin or guard piece will not touch the roller twice in the course of a year except when the train is reversed by setting the second hand backward.

I have a watch without any safety device. The guard pin has been removed. This watch was not especially prepared in any other particular for the test to which it was subjected. It was merely selected from stock and the guard pin broken off. It has been carried for a long period in the pocket in ordinary use, on street cars, bicycles, horseback and railway trains. It has just completed a journey of 2,500 miles, one night having been spent by its wearer in an upper berth immediately over the trucks of a sleeping car. During this time it has never gone out of action even though it has dropped to the full length of the chain by which it was attached to the wearer's vest, three or four times. I have used the term "out of action" instead of overbanked, as is sometimes done, for the reason that the terms are not synonymous. A watch that overbanks is one where the extent of vibration of the balance is so great that the roller pin passes entirely around and strikes the outside edge of the fork, thus causing acceleration of time. When the guard pin passes the edge of the roller so that the fork slot will not be in position to receive the roller pin, it is said to be out of action.

The claim for the double-roller escapement is additional safety against going out of action. This is secured by a deeper penetration of the guard piece into the path made by the outside of the roller and as a consequence less wedging action when the guard piece impinges against the edge of the safety roller. Its disadvantages are that it becomes necessary to make the fork somewhat heavier to form this guard piece. Thus increasing the weight of the fork increases the loss by impact. It must be borne in mind that the fork comes to a rest immediately on delivering its impulse to the balance and remains in this condition until released by the roller pin on its return. The inertia of the fork is overcome by the balance striking it while at its greatest speed.

The difference between imparting motion to a piece by applying gradually increasing power or by sudden impact, will be readily understood if you will imagine attempting to move a train of cars by bringing a locomotive at full speed against its rear end. This, on a small scale, is what a balance has to accomplish in imparting sufficient motion to the fork to provide the unlocking of the escapement. Another disadvantage in the double roller is that for an extent of 15 to 20 degrees at each side of the impulse, the safety action does not take place between the edge of the roller and the point of the guard piece, but between the jewel pin and fork horns.

The advantages claimed for a table roller is that the safety action, under all circumstances, takes place between the guard pin and the roller edge. The horns of the fork may be entirely dispensed with without impairing its efficiency, also the fork may be made lighter than in the other form. The disadvantage is that the guard pin penetrating a less distance into the path of the roller edge, will, when thrown against it, impinge with a more wedging action, and for this reason it requires more careful adjustment.

I will now ask your attention to simple instructions for the adjustment of a detached lever escapement. We will assume that the escapement being treated, has been originally correctly designed, and has simply become deranged by accident or otherwise. First try the action of the escape wheel tooth as it passes over the impulse face of the pallet stone. When it slides

from the locking face both impulse faces should form a slight angle of the divergent, the locking corner, only, of the escape wheel being in contact with the pallet stone (see Fig. 1). As it passes along the impulse face, this angle should gradually decrease until the faces are practically parallel (see Fig. 2), and before leaving, the other corner, only, of the escape wheel tooth should be in contact with the pallets (see Fig. 3). As to the locking, there should always be an angle of divergence between the locking face of the escape-wheel tooth and that of the pallet stone, the locking corner, only, of the escape-wheel tooth being in contact with the locking face of the stone (see Fig. 4). Drawing out the receiving stone increases the angle of impulse and draft. Drawing out the discharging stone decreases the angle of impulse and draft, and vice versa. This point should be steadily borne in mind. Having secured the proper action of impulse, see that the locking is just sufficient for safety, the usual amount being three-quarters of one degree of a circle, also, that as the escape-wheel tooth is released from one pallet stone and another tooth drops to the other stone, that the drops on the receiving and the discharging

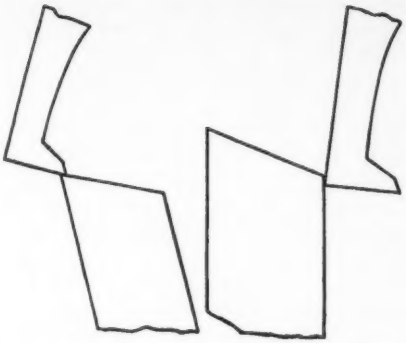

Fig. 3 Fig. 4

are equal. This will be the case if the escapement has originally been perfect, if not, a slight alteration can be made by pressing one or the other stone toward the inside or outside in its slot, care being exercised that the amount of movement shall not be sufficient to derange the impulse or draft action. Now, close the banking so that the instant the escape wheel drops the slide of the fork shall strike the banking pin; now, try the draft by lifting the fork slightly from each banking to see that it returns promptly.

Having thus secured the proper adjustment of the escape wheel and pallet action, we will proceed to the fork and roller action. First see that the guard pin is perfectly central with the fork slot, and upright. Now by moving the banking screws adjust the fork so that when it strikes each pin there shall be just sufficient freedom to allow the edge of the roller to pass the guard pin. If it is found that in this condition the escape wheel will escape from one pallet stone and not from the other, swing the pallets on the pallet arbor, changing their position with the fork so that it will escape on both sides. Should it be found that it escapes on neither side, move the guard pin slightly forward and open the bankings. If it is found that after the escape-wheel tooth has dropped on the locking face it still slides up a distance on that face, move the guard pin backward and close the banking. You will now have what is known in watch-factory parlance as "a watch banked to drop." It will be necessary finally to determine whether the roller pin is at the correct distance from

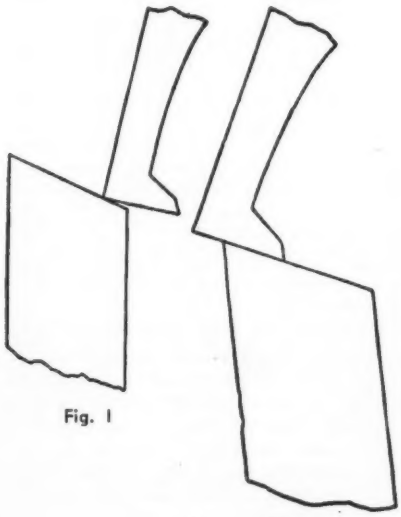

Fig. 1

Fig. 2

the center of the roller. To determine this move the balance slowly until an escape-wheel tooth drops on the locking face, then move it slightly backward but not quite sufficient to unlock. Holding the balance in this position, grasp the fork with the tweezers and try the shake. If the roller pin is fairly embraced by both sides of the fork slot this shake will be found normal. If it is not it will be found excessive. In this case move the roller pin slightly forward until the desired result is secured. If it is found that the roller pin will not pass out of the slot of the fork, move the pin slightly backward. By no means attempt to remedy this defect by opening the banking. Finally, open the bankings just sufficient to give about the same amount of slide on the locking faces of the stones that there is lock, and the escapement will be perfectly adjusted.

BOOK REVIEW

Gears for Small Mechanisms

By. W. O. Davis
N.A.G. Press Ltd., London

This book with its thorough analysis of gears for small mechanisms and its advice to designers, producers and users is the first of its kind. No other book on this increasingly important subject is in existence.

Terminology employed is that in common usage, rather than that of the academicians, and while it was found impossible to avoid some use of symbols not recognized universally, their number has been kept as small as possible.

The text deals with the theory and practice of the design of very small gears; friction and efficiency of tooth action; design of tools for cutting and generating gear tooth forms; production and testing of gears used in watches, clocks, indicating instruments, recording instruments, automatic control mechanisms and similar devices.

The author, Wilfred Owen Davis, is an engineer who has specialized in small gears and mechanisms for 20 years. He has built up his unique knowledge through experience and the necessity to develop basic theory where none existed before.

Containing 157 pages, and profusely illustrated, it is available from the American Horologist & Jeweler book department for $5.00 plus ten cents postage.

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HAMILTON SPACE CLOCK TELLS TIME ON MARS

THE WORLD'S first inter-planetary timepiece, the Hamilton Space Clock, was introduced to the scientific and public press January 14 by its inventor, Dr. I. M. Levitt, director of the Franklin Institute's Fels Planetarium, Philadelphia, and George P. Luckey, president of the Hamilton Watch Company, sponsors of the project. The reception was held at the Waldorf Astoria Hotel in New York.

Created to demonstrate the differences between "Earth time" and the time on other planets, the clock simultaneously records the hours, date, month and year on Earth and the planet Mars.

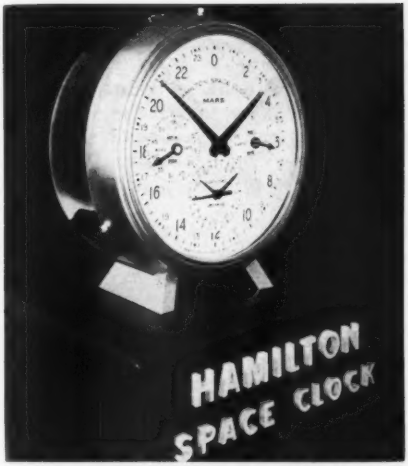
"Of course, the Hamilton Space Clock is still in the experimental stage," Dr. Levitt explained, "but it is important as the first attempt to demonstrate the inter-planetary time differentials a future space explorer must consider when planning journeys into outer space."

After completing a series of astronomical calculations several months ago, Dr. Levitt asked the 62-year-old Hamilton Watch Company, a respected pioneer in the American watch industry, to turn his theory into a working model.

The clock, which holds four dials, divides the Mars year into the conventional twelve months, and those months into days which—on Mars—are 24 hours, 37 minutes, 23 seconds long. The circumference at the face itself indicates Martian time. One dial set into the face records Earth time, while the other two are month-and-year calendars for both Earth and Mars. The face and exposed works are enclosed in egg-shaped amber plexiglass casing which is mounted on a square pedestal with two rectangular brass feet.

The Space Clock theory was conceived by Dr. Levitt because he felt that a clear understanding of the time problems involved in space travel should be a major consideration of those scientists who contemplate inter-planetary expeditions.

The Hamilton Watch Company assigned one of its top engineers, Ralph B. Mentzer, assistant director of its Process Development Laboratory, to undertake construction of the world's first space clock.



Created to demonstrate the inter-planetary time differentials a future space explorer must consider, the Hamilton Space Clock simultaneously records the hour, date, month and year on Earth and the planet Mars. Numbers around the face indicate Martian time. The small dial in the center tells Earth time. The dial at the left is the Mars month-year calendar; the other, Earth. The clock is mounted on a 22-inch square pedestal four feet high.

Among the dramatic differences in living on another planet which the clock demonstrates:

If you are used to an eight-hour work day on Earth, you will work about 12 minutes longer on Mars. While a year goes by on Earth, only slightly more than half a year has elapsed on Mars. A young lady of 21 on Earth, would theoretically find herself just 11½ years old on Mars. A two-week Earth vacation would be stretched to almost four on Mars.

For demonstration purposes, Dr. Levitt provided an accelerator to speed up movement of hands on the clock by more than 2,000 times to show graphically the time

differential existing between the two planets. This "time-flyer' is an integral part of the Hamilton Space Clock.

According to Hamilton's President Luckey, "We built the Hamilton Space Clock as a service to science. Understanding of its function will help the first adventurer into outer space to better comprehend the problems he will have to face."

Construction Fact Sheet On The Hamilton Space Clock

The Hamilton Space Clock, without its cover, base and pedestal, is composed of almost 400 parts. Because of the acceleration and velocity requirements of the time trains, the horological gearing is of much sturdier design than is used in normal clock work.

The basic motive power is a laboratory type heavy duty synchronous motor which operates on the 60-cycle public utility service available in the home. But through a specially constructed overhead-running clutch, a high-speed aircraft type geared-head series motor is manually controlled by a variable transformer in such a manner that infinitely adjustable speeds are automatically coupled into the mechanism. The demonstrator may thus accelerate the clock beyond the normal or synchronous speed by any factor from unity to over 2,000 times.

Dr. I. M. Levitt, inventor of the clock, projected his anticipated future rocket trip to Mars to start in the Earth year 1970 (3551 Mars), and suggested that this special instrument should provide for indicating the continual lapse of time for a 20-year interval, i.e., January 1, 1970, to December 31, 1989, inclusive.

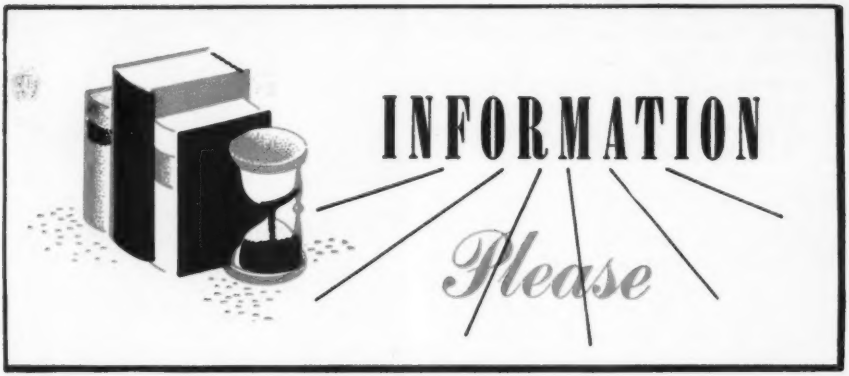
Because of the 20-year period Ralph B. Mentzer, the Hamilton engineer, inserted in the mechanism both month and year indicators of 35mm. film bands which are suitably connected through kinematic chain reactions. Because the clock is still in experimental stage, its construction displays techniques no longer used in commercial clock manufacture.

Since one purpose of the Space Clock will be for lecture demonstrations, it was apparent that some means of accelerating time was necessary—otherwise continual observation for about two years would be required even to prove a single operating cycle of the complete device. Mr. Mentzer solved this problem by devising what he calls a "time flyer." Thus, a full 24-hour Earth day can be observed during a 45-second interval. By setting the mechanism with the use of manual adjustment knobs, a quick review of any specific sequence of time is possible. Dr. Levitt is thus able to demonstrate the combined action of the clock during a lecture with all elements functioning at the same time.

The Hamilton Space Clock, the world's first clock to tell the time on Mars and Earth, under construction by Ralph B. Mentzer, assistant director of the Process Development Laboratory, Hamilton Watch Company. The clock was built by Hamilton as a service to science.

The clock itself was constructed and assembled in Mr. Mentzer's home workshop, and the plexiglas case and wooden base by the Hamilton display department.

"No sir, all my clocks keep terrible time —why don't you try my competitor across the street?"



BC: What can be done when a customer brings in a watch for repairs and cleaning which has been in salt water?

Answer: If the owner or you are where you can do so, open the case and submerge the watch in naphtha or kerosene. In the absence of these, use pure alcohol. The only objection to using naphtha is that in the process of distillation, sulphuric acid is sometimes used and a trace of the acid may be carried over into the naphtha. In cleaning the watch that has been in salt water, the steel parts should be boiled in alcohol to which a little freshly slaked lime has been added.

CB: Would you recommend the use of greasy-type lubricants for the winding and setting mechanism of the watch?

Answer: Winding parts require a lubricant that will stay at the point of action, neither spreading nor running away or being squeezed out by comparatively heavy pressure. A touch of vaseline answers very well. Clock oil and beeswax will also do a satisfactory job. Melt two ounces of beeswax and when liquid, add two ounces of clock oil, stir well and when cool it will be ready for use.

DN: I have a French clock that loses time as the spring runs down—in other words, it keeps time for the first few days of the week and then begins to lose time. It is an eight-day clock. Is there anything I can do to improve the rate?

Answer: May I suggest you gradually reduce the thickness of the suspension spring toward its lower end. This operation calls for care in not making too much reduction at one time. Compare the rate when the clock is fully wound, then release the mainspring halfway and check the rate again. After a few trials, you will find considerable improvement in the timekeeping of the clock.

PR: Occasionally I have cause for bending or re-shaping steel parts such as levers for clocks or different tools. By heating the lever to a dark blue it is possible to bend the part without much danger of breaking it, however, on heavy pieces it takes considerable effort and it is not always convenient. If I heat the piece red hot it will then bend readily. Why can one bend the metal more easily when red hot than when it is cold?

Answer: When a metal rod is heated red its molecules do not cling together so strongly, thus it is always easier to change their positions or shape of the heated metal as the molecules are more easily rearranged. However, after heating the lever or bar of steel and reshaping it, the steel will be quite soft and should be reheated to a cherry red and then quenched in water to harden it when it will become glass hard and not suitable for use until it is tempered. To temper the piece, the surface should be clean and the piece laid

INFORMATION PLEASE

Directed by
W. H. SAMELIUS

Chairman, Science of Horology and Technical Advisory Board

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This machine produces uniform automatic reversing of the basket in each solution jar for unbeatable watch cleaning.

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Constant field contacts had proved the need for the MASTERMATIC at a price that thousands of watchmakers could afford. Their immediate acceptance of this machine has proved again how well L & R knows the requirements of its particular industry.

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Price $92.50
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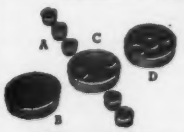

DIVIDER PARTITION
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CLOCK BASKET INSERTS
Trays: 2⅛" dia. x 9/16" deep
Cups: ⅜" dia. x ½" deep—$6.75

The reversing action of the MASTERMATIC is automatically controlled by the actuator externally projecting from the rear bottom of the motor. It automatically functions only when the basket is lowered into the solution jars. The machine is also engineered so that there is one direction rotation only in the spin-off and drying positions.

WATCHWORD OF THE WATCHMAKER
L&R

on a hot plate allowing heat to penetrate slowly until the surface shows color. The first color appearing will be a very light yellow—that temper will be suitable for turning tools. Further heating to a straw color would be suitable for drills and taps, still deeper color of dark straw with a purple shade would be suitable for screwdrivers and a dark blue color for heavy springs and a light blue color for delicate springs. If heating is still continued the surfaces will turn to a greyish color, indicating that all the hardness has been drawn out and no more tempering can be accomplished.

GDS: How many half turns on the winding arbor for the ordinary watch should it take to wind a watch fully?

Answer: The number of half turns of the winding stem varies in different watch models as there are factors which have great bearing on this operation. For instance, some watches have thick mainsprings that will give possibly five turns of power, while there are other watches that employ thinner mainsprings and longer mainsprings that might yield six to six and one-half turns, then the winding wheel ratios vary in different models. Some of the winding arrangements are so designed that full winding is quickly completed. This arrangement generally results in a hard-to-wind watch, while other gear ratios are such that it requires a longer time to fully wind the watch but the winding will be smooth and easy, requiring very little effort. The size of the winding crown is also a factor—the larger the crown, the easier it would be to wind the watch and a small crown does not offer the grip for smooth winding. You do not state the purpose for asking this information, but as a guide to the winding up of a watch, counting the turns of the stem is altogether unsound. Customers, especially women, sometimes attempt to wind their watches that way by a certain number of turns and the result is that ultimately the watch will run down although the customer has wound it regularly each day. The method of counting the number of turns is usually resorted to by those who are really afraid to wind their watches for fear they may break the mainspring. It is better to instruct and explain to the customer that no harm can come in winding the watch unless it is forced and it is an easy matter to tell when a watch is fully wound as the crown will come to a stop, signalling that the winding is complete.

RT: I have a French clock in which I must replace the pendulum, as the old pendulum is missing. How can I determine the proper length of pendulum required in order to make the clock keep correct time?

Answer: You state this is a French clock. Use the following formula: multiply the number of teeth in the center wheel by the number of teeth in the third wheel and by twice the number of teeth in the escape wheel, then multiply the number of leaves in the third pinion by the number of leaves in the escape pinion, dividing the first result by the result derived from the pinions. This will give the vibrations per hour the pendulum is to make; divide vibrations per hour by 60 which will give vibrations per minute. Then the minute or 60 seconds by vibrations per minute, the results will be seconds per beat. Squaring seconds per beat and multiplying by 39.14 which is the standard length of seconds beat pendulum, your final answer will be the required length for the new pendulum in inches. The length of the pendulum is measured from point of flexation to the center of the bob, or mass of weight. From there on slight regulation will bring the clock to time.

BB: Is it a good practice to undercut meantime screws or decrease their weight when bringing a watch to time or when poising the balance wheel?

Answer: The weight of the meantime screws ordinarily should never be changed as they are used for timing the watch by turning them in or out of the balance as required to bring the watch on time—the final regulation is accomplished by use of the regulator. If any reduction in weight is necessary to poise the balance or to bring the watch on time, it should be accomplished by undercutting the balance screws or substituting lighter ones. It is a good practice before attempting to poise the balance to see that all meantime screws are turned out from the balance equal distance, and a safe way to assure yourself the screws are all at an equal distance from

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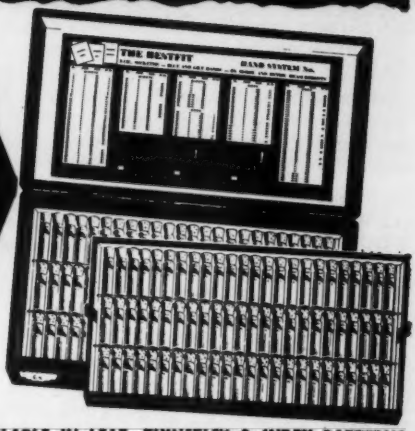

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the rim is to turn them up tight to the rim and then back them out an equal number of turns. It is also very important that when using the meantime screws that you turn each one exactly the same amount in order to keep the balance in poise, otherwise you may be disappointed to find that position rates on edge will vary considerably.

GA: Will you name the shapes and how the shape of the curves are developed for watch wheels?

Answer: To answer your questions fully would take considerable space, in fact a complete textbook on gearing. As you must be interested in gearing, may I suggest that you request a list of textbooks from the American Horologist where you will find several books treating on gearing. However, for a little preliminary information which might be interesting, I would say that the epicycloidal curve is used for train wheels. The curve of the tooth is generated by the motion of a point on the circumference on the circle rolling upon a circle, then we have a cycloid. This curve is used for a contrate wheel or crown wheel; the curve is generated by the motion of a point on the circumference on the circle rolling on a straight line. The hypocycloid is used for the sides of pinion leaves—it is generated by the motion of a point on the circumference of a circle rolling within a circle or the concave side of a circle. The involute curve is used for heavy duty stem wind wheels, etc:; it is generated by the end of string as it is unwound from the circumference of a circle. The worm and worm gear are used where a high or low gear reduction is required, such as music boxes, phonographs or electric clocks.

HEV: My present employer insists that I test every watch for magnetism before I repair it. Do you believe this to be necessary?

Answer: Every watch should be tested for magnetism even before you disassemble it for repairs or cleaning. This is a good habit and will save you a lot of time and trouble. If you attempt to repair a watch that is magnetized, the chances are all in your favor that the screwdrivers and tweezers and any other tools you may be using will become magnetized. From there on the next watch you handle you will magnetize those parts when using the tweezers and screwdrivers, and any watch that has become magnetized will show erratic rates. An ounce of prevention by demagnetizing the watch first may save you many pounds of trouble. You will have satisfied customers rather than dissatisfied customers, your reputation as a watchmaker will go up instead of down, and at the end of the day you can retire with a clear conscience and no worry as to what kind of time your watches will show the next day. You will feel confident that they will be on time.

MFP: I traded in some old watches on a new pocket watch. Among the old watches I found one that I became interested in. It is an 18S key winder marked "G. A. Reed. United States Watch Company, Marion, New Jersey." Can you tell me anything about this watch or its history?

Answer: From reference books we find the United States Watch Company made several different models and grades and named each new model after some official or member of the board of directors. The United States Watch Company was organized in New Jersey in 1854, it failed in 1872, was reorganized as the Marion Watch Company and failed again. Among some of the watches they made during 1867 were the Frederick Atherton, Fayette Stratton, George Channing, and Edwin Rollo. In 1868, S. N. Beard, John Lewis, A. H. Wallace and Alexander Randall; during 1869 and 1870, the G. A. Reed, Asa Fuller and J. W. Deacon appeared on their watch plates.

LV: When cleaning incabloc assemblies I have trouble removing the cap jewels. Is there any trick or easy way to remove the cap jewels?

Answer: The following suggestions should be helpful. First, release the holding spring to loosen cap and hole jewel, then remove cap jewel and setting, and dip in naphtha when the cap jewel will drop out.

DWR: When hard soldering is there any way to prevent the hard solder from flowing where it is not wanted such as when repairing wrist bands or chains? I use borax as a flux.

Answer: Either soft solder or hard solder may be restricted to any desired part of the job by using the following suggestions:

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E242	2	13	7½"	E475	5	11	13½"
E304	3	11	9½"	E485	5	13	9½"
E306	3	11	11½"	E536	6	10	10½"
E345	3½	11	14"	E536A	6	10	11½"
E397	4	11	11½"	E542	6	11	11½"
E406	4	12	9½"	E545	6	11	13½"
E412	4	13	8½"	E599	7	10	10½"
E413	4	13	9½"	E601	7	10	11½"
E414	4	13	10½"	E609	7	11	10½"
E430	4½	13	10½"	E610	7	11	11½"
E460	5	10	10½"	E621	7	13	9½"

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Prepare the joint in the usual manner, then paint the parts you wish to protect with a mixture of soft rouge and denatured alcohol. The rouge should be mixed with sufficient alcohol to make a rather thick paste; after this mixture is applied to the restricted parts, the job should be heated just enough to dry the rouge, then the borax may be applied and accomplished in the regular way. Naturally, the best results are obtained when all grease and dirt are removed from the parts to be soldered; often the dirt or grease will cause the rouge to peel off when heat is applied. If the mixture of rouge and alcohol is too thin, the alcohol will carry the rouge where it is not wanted and will cause failure of the operation as the solder will not flow properly. This method is excellent where a small emblem is to be soldered on a flat top of a ring. The solder may be placed in the center and the rouge applied around the edge of the emblem, then when the solder flows there will be no risk of it flowing out on the flat surface.

NVS: I recently opened a small store of my own and am doing very well with my watch work. However, I find that many of my customers request various articles engraved and I am established in business and cannot take time to attend a school for engraving. I procured some engraving tools and copper plates and started to practice, and at the present time I can do a fair job. I would like to know if there are any rules as to the placement of names on various articles and how I can transfer letters when engraving spoon handles. What method must I follow?

Answer: For transferring letters to spoon, knife and fork handles, purchase some modeling clay which can be obtained in most any ten-cent store. Cut one spoon handle as a master piece, fill the cut with soft grease such as lard, then press the handle into the clay, leaving a deep recess. Then it is an easy matter to place the spoon handle into the same recess with just a little pressure sufficient to take the impression. Ten or twelve transfers can easily be made this way, and for transfer wax, the following formula may be used: 4 parts beeswax, 1 part beef tallow and ¼ part Canada balsam. Heat and melt the beeswax and tallow, then stir in the Canada balsam. Use wax when cool.

1. For designing of soft lacquered surfaces, cover with wax and whiting and use a rubber marker to prevent scratches. 2. For metal surfaces, generally use Chinese white and a sharp pencil for monograms or complicated layouts. 3. For small articles with 1, 2 or 3 letters, cover surface with wax alone. This is usually satisfactory and is quicker. 4. Engrave belt buckles with loop to right when in the block. 5. Engrave pocket knives with the blade to the left or on top. 6. Engrave compacts and cigarette cases with hinge to the left. 7. Engrave pens or pencils with cap up, except when engraving name on barrel, then have point to the left. 8. Inside rings, start beside karat mark and work to the right. 9. On personal articles, baby cups, etc., engrave so user can see the engraving. On articles to be used serving company, place engraving so guests can see it, tea pots, etc. 10. On sterling, straight out with liner when Old English or block is used. 11. Generally speaking, wriggle on plated silver. 12. In using dividers to make a circle on various metallic objects, wet a small piece of celluloid with acetone and place in center for sharp point of dividers in order to protect the metal. 13. Never use acetone on lacquered or enameled surfaces. 14. When bright cutting soft white metal and aluminum, the graver must be well polished and constantly lubricated by wetting in coal oil, turpentine or alcohol. 15. In duplicating lettering when transfers are not desirable, use dividers to transfer different dimensions. 16. To remove lacquer from large cups and trophies, dissolve Red Seal Lye in a porcelain vessel. Proportions, about ¼ pound to one gallon water.

LB: I recently repaired a Marine chronometer and when completed, I found it is running considerably faster than our regulator. I made several changes to the balance to bring it to time, now the customer says the instrument runs too slow. He is an astronomer and uses it for time observations. What must I do to satisfy this customer?

Answer: The business day or time is taken from the sun and is known as solar time by which we all regulate our affairs. The astronomer takes his time from the stars, known as sidereal time. Due to the rotation of the earth and the sun, there is a

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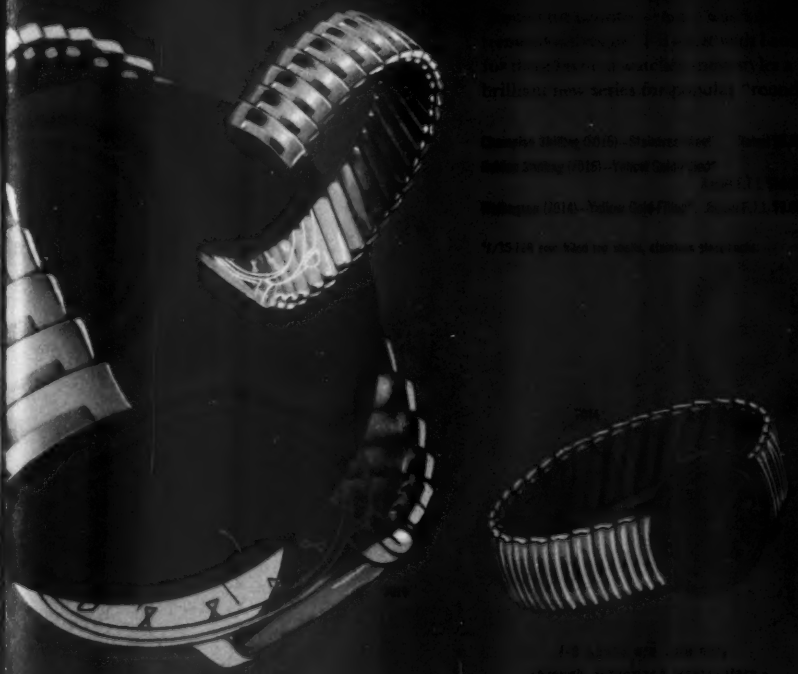

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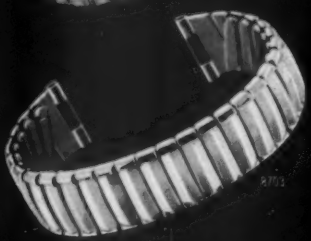

JB

Jewelers' Best

difference between the two observations; the sidereal day taken from the stars is 3 minutes and 56 seconds plus faster than a solar day, so you will have to make changes to your balance or the hairspring or whatever means you resorted to in order to make this chronometer show 3 minutes 56 seconds faster than the solar day or standard time.

JMF: Is there any shop rule to find the proper thickness of a mainspring which is lost? I have an old watch, key winder and a keepsake, in for repairs and unfortunately the broken sample spring was lost in the mails. I am at a loss to know how strong a new spring should be.

Answer: There is a shop rule that works out very well especially on the early key wind watches. To find the thickness of the mainspring required, divide one-half of the open area or radius of the barrel by twelve, or the number of coils usually found in ordinary watches. Results will be the thickness of spring suitable for that watch. Another way and a correct way to find a suitable mainspring is by the area the mainspring is to occupy. Square the radius of the inside of the barrel and multiply by 3.1416—this will give the area, then square the radius of the barrel arbor and multiply by 3.1416, subtract area of barrel arbor from area of barrel. This will give space or area for the spring and for action of the spring. Dividing the space by two will give space or area that mainspring can occupy, and dividing the results by 12 you will have the thickness of the mainspring suitable for that particular watch. Then by dividing the space for the mainspring by its thickness, you will have the proper length.

JRF, Jr.: I hear a great deal about Eli Terry and his early wooden clocks. Was he located in this country or was he a famous English clockmaker? Can you give some highlights and his activities?

Answer: Eli Terry was born in 1772 and died in 1853. He retired in 1825. He initiated the manufacture of clocks in quantities, making the first clock with brass movements. In 1809 he formed a company with Seth Thomas and Silas Hoadley to make wooden clocks, and left the firm in 1810 to go to Plymouth, Connecticut. Terry's first clocks were wall clocks known as pillar scrolled top clocks. A Terry clock today is considered a choice collector's item.

HMZ: When soldering a hinge to one of the lids on a gold filled case, the lid turned black like brass. Did the heat cause the discoloration and is there any way to bring back the gold color without replating? I put the lid in a pickle of 12% sulphuric acid while hot, but the color did not return.

Answer: Hard soldering blackens low karat gold and unless it is thoroughly protected by being covered with rouge and alcohol as referred to in this column, it may be discolored. Or you may cover the surface with borax, in which case it must be pickled in sulphuric acid, thoroughly rinsed and repolished. If you cannot restore the color by brushing with a fine steel or brass wire scratch brush, you have evidently got a cheap plated case instead of a gold-filled case and the plating was so thin it would not stand hard soldering. In such instance the entire case will have to be replated.

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3. **Algren spring bar kit; double flange, 72 assorted sizes.**

How It Works:

Send in one or more entries to Contest Dept., American Horologist & Jeweler, P. O. Box 7127, Capitol Hill Station, Denver 6, Colorado. A prize, material for the most part, will be awarded to the sender of each entry.

Each entry, as received, will be awarded a number for impartial judging. Names of 1-2-3 winners will be published upon receiving prizes; 1st prize winners shall be eligible to compete for Grand Annual Prize. Publication of entries shall appear at discretion of the Editor. All entries become the property of A. H. & J. and cannot be returned.

First judging ends February 20, 1954.
Entries should be mailed before that date.

JUDGES: **W. H. Samelius, Dean of American Watchmakers, Editor "Information Please," A. H. & J.**

J. E. Coleman, Foremost Clock Expert, Editor "Clockwise and Otherwise," A. H. & J.

Henry B. Fried, Horological Instructor and Author, President of Horological Society of New York.

First Contest Series Ends February 20, 1954.

Mail Your Entry NOW To:

Contest Dept.
American Horologist & Jeweler
P. O. Box 7127, Capitol Hill Station,
Denver 6, Colorado

Once upon a time there was a very slap happy dragon named Oswald. The poor coal burner, who was not very sharp in the upper story, was always breathing out flames at the wrong time and setting fire to his den to the annoyance of the Insurance Company.

OR carrying off maidens so inconceivably homely that even apprentice knights wouldn't bother to try and rescue them.

OR eating Knights Errant armour and all, which gave him a severe stomach ache.

AND other things too numerous to mention.

In fact the scuttlebut among his fellow dragons was that Oswald was a disgrace to the local dragons association.

Taking our cue from the sad plight of poor Oswald, we are constantly, from day to day and month to month, trying to improve our operations to make and keep them as efficient and streamlined as our customers deserve. Being human, we will probably make an occasional mistake, but we think that you will find your orders correctly and completely filled, and the service as prompt as the mails will permit.

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CLOCKWISE...*and*...OTHERWISE

By J. E. COLEMAN

OTHERWISE

We had speculated a bit on what would be the first clock tool offered in trade in 1954 and it looked as if the February column might go to press without it when Mr. P. F. Laks, of M. J. Lampert & Sons, Inc., fired in a new movement stand. This is a well machined item and we find it quite practical—it is some 16 inches in height; base of the "crow-foot" type with two leveling screws in two of the toes—the main stem is steel rod threaded into the base. The two clamps (upper and lower) ride the stem with large thumbnut, therefore are adjustable up and down as well as around the complete 360 degrees—the lip end of the clamps are five inches broad. Most shops have for years used two conventional types of movement stands, one generally referred to as a "French stand" because the clamping portion was two V's when screwed together, was ideal for holding round movements, the other, sometimes called "American," had two upright posts and its clamping members sliding between them. Neither of these stands is adaptable to holding cuckoo movements or the larger chime movements from mantel clocks — even some of the French and American movements don't go so well in the old stands because of insufficient pendulum length. The designer of this stand certainly knew of this shortcoming. Mr. Laks says, "The new stand will be available at your regular material house by the time this column reaches you, priced at $5.95."

* * *

Mr. David Phillips of D. Van Nostrand Company, Inc. writes that his firm has released "Watch and Clockmaking and Repairing" by Gazeley, saying that it covers gearing, wheel cutting and the making by hand of unobtainable parts. The section on clock escapements covers pinwheel, gravity, verge and Brocot escapements as well as recoil and dead beat. It is well illustrated with fine line drawings and an appendix on "Causes and Failure of Timekeeping" and a complete index. (Available through the A.H.&J. Book Department, $10.00 plus postage.)

* * *

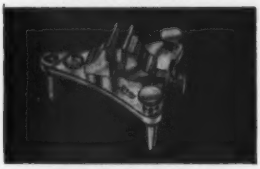
Visits, mail and long distance phone calls fine to start the year off. A couple of columns back we passed out a raincheck to Mr. P. Jolin of 478-A Bloomfield Avenue, Verona, New Jersey, on a clock marked: "P. Ketterer & Company, Comane Street, Stirling." We wrote Mr. S. Norris of Glasgow, Scotland who is the secretary of the west of Scotland branch B. H. I. He was most cooperative and wrote that he had placed the query in the hands of one of their members resident in Stirling. Following is the reply received from Mr. James Mackie of Stirling; Mr. Mackie has thoroughly explored every available possibility and we especially ap-

Mr. Coleman invites your questions. If your question requires a direct answer, please enclose a self-addressed, stamped envelope. It is impossible through correspondence to give valuations of antique timepieces; questions of this nature cannot be answered

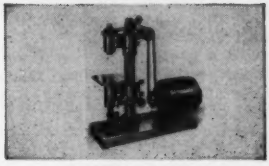
TURRET LATHES

SLIDE RESTS

PRECISION LATHES



POISING TOOL



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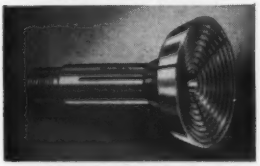
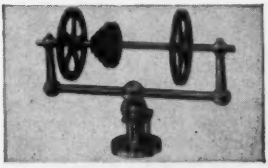


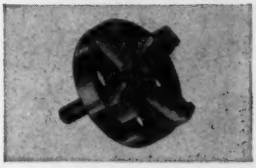
WHEEL CHUCKS

HAIRSPRING TRUING CALIPER

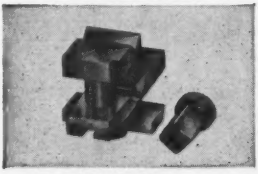
PIVOT POLISHER



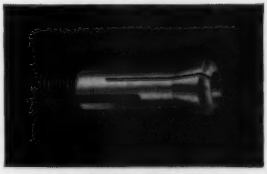
COUNTER SHAFT



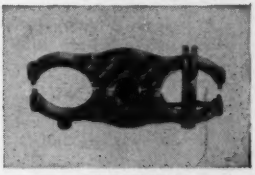
3 & 4 JAW CHUCKS



UTILITY SET



WIRE CHUCKS



2 IN 1 CALIPER

ASK YOUR DEALER FOR GENUINE LEVIN TOOLS

preciate this cooperation.

Dear Mr. Coleman:

Respecting the request for information on a Schwarzwald type clock lettered "P. Ketterer & Co." Comane Street, Stirling. This name is not included in any list of Scottish makers and after considerable inquiry, I have reached the conclusion that this person was only resident in Stirling for a few years and was not a maker but was probably a "Packman," i.e. traveled around the country taking orders to supply clocks, etc.

In explanation of the above conclusion I will enumerate the various inquiries and answers. 1. The address Comane Street is a misspelling, as this should be Cowane Street. 2. There is no record of a P. Ketterer in the records of the Hammersmen's Guild. This therefore places him later than 1800 A. D. 3. I have seen another clock with this name, but this was an 8-day long case British clock (not a local product) which I would place as made after 1850 A. D. 4. Inquiry at Post Office (old records)—no results. 5. Inquiry at offices of Registrar of Births, deaths, etc.—no record of P. Ketterer. 6. Inquiry at office of Town Clerk —no record of P. Ketterer, including examination of burial records back to 1750 A. D. 7. Old directory for 1860 A. D.—P. Ketterer not mentioned. 8. Information from a gentleman, resident in Kippen, a village about 9 miles from Stirling — a P. Ketterer sold a clock to his grandmother. This informant states that the clock was a Schwarzwald type, but when selling the clock he was operating from a town in the west of Scotland and the possible approximate date of sale is 1880 A. D. 9. Information from an old lady now 95 years old who was a resident as a child in or near Cowane Street, Stirling—no watchmaker or clockmaker of the name P. Ketterer had business premises in Cowane Street about 1870. 10. In view of the above and the possible residence in Stirling of P. Ketterer, at some time between 1870 and 1880 and the knowledge that several Germans associated with the clock and jewelry trade came to Stirling about 1870-71 to escape the Franco-Prussian war, it appears to me that Ketterer may have been one of this group, as Ketterer is a German name.

The name is not unknown in German clockmaking, in reference to Franz Anton Ketterer, 1670-1750, one of the first clockmakers in the Schwarzwald. One of the group of Germans settled in Stirling was Lambert Hepting. This gentleman eventually founded a watch and clock business in Stirling and a considerable number of German clocks were imported and sold at this time, particularly in the country districts, where these clocks sold freely at a much lower price than the traditional British type.

It appears, therefore, that P. Ketterer may have spent a short time in the locality selling these clocks, but no business or business address can be traced for this name.

In reply to your second inquiry, I do not think that Schwarzwald pattern clocks were ever made in this country, although one cannot be certain that an occasional clock may not have been made.

The prevalence of German (Schwarzwald) pattern specimens with Scottish names lettered is due to the import of large numbers of these clocks and the popularity they enjoyed in the late nineteenth century, when as stated above, a considerable number of Germans settled in the country, and the practice of the retailer having his name lettered on the dial of the clocks became the custom.

JAMES MACKIE, C. M. B. H. I.

26 Port Street
Stirling, Scotland

These letters are always very valuable in the light of general clock information, aside from the particular question in point. This one represents an on-the-spot investigation, and gives general pointers on how clock business was conducted there a century ago. It is a graphic illustration of how and why we are unable to identify some of the names submitted.

* * *

A fine letter from Mr. Abner J. Hay. We were just about to insert an answer to that question we overlooked in his November query (page 44) when the following letter came in:

Dear Mr. Coleman:

In the last issue of A.H.&J. you answered two questions which were of great importance to me, and I thank you very much. I found the answers very clear and they help me a lot. However, there was one question asked and no answer given. That question was, "How to tell an 8-day from a one-day clock?" I was both surprised and happy to find the enclosed letter in my mail box. New Bay is quite a distance from Little Rock—a long way to go for an answer.

I think this answer very clear and for almost any practical purpose complete enough. Actually I should have reasoned this out myself, but somehow it never had crossed my mind. I really expected something much more complicated than this, such as counting teeth and measuring pendulum rods and winding up with a lot of fractions too difficult to be of much use to me. I would just as soon wind the spring and set the clock to running, let it run until it stops, then count the days, than wear myself down with arithmetic. However, I do wish I had all those formulas having to do with horology to file away and use when I am forced to.

ABNER J. HAY

2218 Pine Street
Little Rock, Arkansas

It is certainly good to see such cooperation and here is something Mr. Hay does not know—I've been reminded about

twenty times about this omission. I appreciate those because they show our readers are keeping a pretty close check on us. The actual truth of the matter is we got busy digging out the yoke anvil cut and making up the verge drawing and just plain overlooked that last quiz.

* * *

Mr. Homer H. Crider of Box 515, Yosemite National Park, California, has some comment on the drill-and-oil synchronous motors, as follows:

Dear Mr. Coleman:

Re: "drill and oil" discussion on synchronous motor sealed units, I want to get in my two bits worth. I am rather surprised that the discussion has not brought out the fact that Telechron does have a unit that opens up, that is, the small end has a large-headed screw that seals with a washer under the screw head.

Furthermore, I surmise that this was brought out specifically at the behest of a large utility for use in demand, meter drives, etc., where a regular program of cleaning and oiling could be maintained. Naturally, it might not be good policy to attempt to equip all synchronous clocks with this unit because of the very nature of the service the unit is put to, that is, it is kept in use until it quits running.

I really believe that one of these units on a regular maintenance schedule would give a hundred years of service. This may help the powerhouse engineer to get up-to-date.

HOMER H. CRIDER

Box 515
Yosemite National Park, California

* * *

Friend Joseph R. Smith, clockmaker, of Crestline, California, also has some comment on the same. His letter follows:

Dear Mr. Coleman:

Recently I sent you my name for your "Cross Index," not that I was soliciting trade work, but being an old timer in the profession, I thought I might offer my services to some younger clock man or some collector who has a clock that is causing trouble. I am writing this to tell you I have changed my address—if you have me listed in your cross file, you have my address as 1755 Hillhurst Avenue, Los Angeles, California. I have moved my shop to Crestline, California, and my mail address is P. O. Box 137. I have bought a home in the mountains among the big pine trees and I really enjoy working up here.

May I add my bit about the question of "drill and oil" of sealed synchronous motors? This may be standard practice in some plants, but it is certainly not good practice. In my opinion, a man who does this should be classed with the man who swishes a movement around in gasoline, puts a little oil on it, and says it is in good running order. Mixing fresh oil with the old oil doesn't make it a good job and even if the motor was washed out and then oiled, you still have the worn pivot holes and it is surprising how badly some of these pivot holes are worn after a few years. I have opened some of these rotor units and found that there was still oil enough, but the pivot holes were worn so badly that the gears were binding. True, in some cases adding a little oil may make it run a little longer, and the same is true of some clock movements, but no real clockmaker would do this and then charge the customer for an overhaul. Personally, I would rather hand the clock back to the customer than to turn out this kind of work.

May I add that I enjoy reading your comments and suggestions very much. It is the most interesting and informative section on clocks I have ever seen in any trade magazine in all the years I have been in the clock repairing business.

May I wish you and yours a belated happy and prosperous New Year?

JOSEPH R. SMITH

P. O. Box 137
Crestline, California

* * *

Mr. Carl Young, clockmaker of Mobile, Alabama, spent some time with us (we ran a photo and description of one of his grandfather clocks about a year ago) and parted with the invitation, "You'll come?", adding that if I'd make it a few days before the New Orleans Convention, he would drive on to N. O. with us, since Mobile is on the route and we've been threatening to take him up on one of these invites—think I'll do it. Had a nice long visit with Lt. W. P. Walkering, watchmaker and column reader, who is now with the U. S. A. F. and based at Fort Worth, Texas.

Our managing editor, Mr. George Martin, came through with his usual first of the year communication. If George ever decides to lengthen the time spaces between letters, we shall have to move him up in the bracket with Mr. Barny who, instead of writing annually, has a batting average now of about one every two years. Let's give him credit, though, for when one does come over it makes up for lost time. Can't include it here, but I can say to you that there are big plans for A.H.&J. for 1954. Mr. Martin tells me that the monthly contest is being reactivated and a new department, jewelry, is being added. This ship will be ably skippered by Mr. R. Allen Hardy from down "Floridy" way. All in all, A.H.&J. will give you more in '54.

J. & J.

CLOCKWISE

Dear Mr. Coleman:

Trouble again. I got in a mantel clock, and after cleaning and starting, it would run fast. It had only a five-inch pendulum; I calculated the train, but it having an idler center threw me off in my figures.

$$\frac{60\times40\times40\times31}{8\quad7\quad8}\div140904=$$

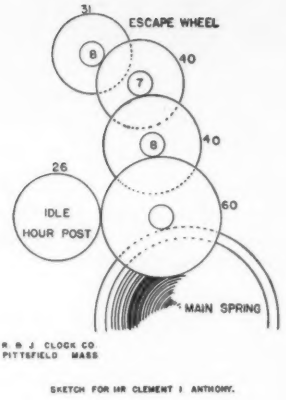
pendulum length. Idler center 26?

I set the clock movement in an old grandmother case and put on an old wooden pendulum stick with a four-inch round pendulum. The clock is keeping time, but swings a 15⅜ inch pendulum to center of pendulum. This clock couldn't have been made for a short pendulum, could it? My customer said it used to run good years ago—escapement and all seem to be original, depthing good, etc.

Please give me the rule for calculating a train with an idler center. I have enclosed a rough sketch of the clock train. How heavy an Invar rod should one use to swing a 25- or 30-pound seconds pendulum, also the width, strength of suspension spring and length? Where can I obtain an Invar rod?

Thank you for your articles in the A.H.&J. I woud like to see you publish a book—I'll bet it would be the most instructive we, the American clockmakers, have ever seen.

CLEMENT I. ANTHONY
Montgomery Creek, California



SKETCH FOR MR CLEMENT I. ANTHONY.

Dear Mr. Anthony:

Russell & Jones Clock Company, Pittsfield, Massachusetts, was in operation about 1884 to 1888. This was originally the Terry Clock Company, and located at Winsted, Connecticut—it was organized by the sons of Silas B. Terry (1807-1876) who was the fifth child of the famous Eli. He was head of the firm until his death in 1876, then the sons moved it to Pittsfield, Massachusetts. About this time there was a reorganization and George Bliss became a member of the firm. Another reorganization took place about 1884; E. D. Jones became president; H. S. Russell, clerk and treasurer, and it was named Russell and Jones Clock Company.

Whether the driving of the hands (center post) of a clock originated in the U. S. or the Black Forest of Germany is yet to be determined—it is certainly a trick both sections used quite a lot. The English, French and Swiss rarely ever used it, and it certainly was not common practice with them. Generally the reason for doing it is to adapt the same trains (or movements) to different length pendulums for different cases.

Your method of counting the train is correct—that is for the second wheel of 60, and what you get is the proper beat if the second arbor were the center or hour post. One glance at the sketch and you will see that the second wheel does not turn once per hour, but only enough to drive the idle-center one revolution. Since your hour-center has twenty-six teeth, the second wheel of the train must turn exactly 26 of its 60 teeth in exactly 60 minutes (one hour).

The twenty-six teeth of the second wheel required to revolve the hands through one hour will at the same time turn the third pinion of eight (8) three and one fourth (3¼) turns. Now, 3¼ turns of the third wheel of forty (40) will put 130 teeth through the fourth pinion of seven (7), and revolve the fourth wheel of forty (40) eighteen and four-sevenths (18 4/7) times. 18 4/7 turns of the fourth wheel of 40 puts 743 6/7th teeth through the escape pinion. For practical purposes the six-sevenths being almost one, we'll call it 744. Now, 744 teeth will revolve the eight-leaf escape pinion ninety-three (93) revolutions. 93×31 teeth equals 2,883, times two beats per tooth equals

5,766 beats per hour. Divide by 60 minutes and get ninety-six and one-tenth (96 1/10th). Because on the other fraction we added, we can throw away this time and for practical purposes call it 96 beats per minute. Invariably these idle drive centers come up with fractions—remember, the nearer it is to the escape pinion the less it matters, and always you have the regulator nut at the bottom of the ball for the final regulation.

If this calculation be correct, then you require a pendulum that will beat ninety-six times per minute. Reid's rule for finding the length is: "Multiply the number of vibrations made in a minute by the standard or seconds pendulum (60) by itself which is squaring it, and this being multiplied by the standard length of 39.2 inches and this last product divided by the square of the number of vibrations by the pendulum whose length is required. The quotient will be the length of the pendulum in inches and decimal parts of an inch."

60x60 equals 3600 times 39.2 equals 141120.

96x96 equals 9216 divided into 141120.0 equals 10.9 inches.

As to size (diameter) of Invar rod, and width, length and strength of suspension spring, you have a very, very wide latitude to work within. The pendulum of pure theory has no weight in the rod, and no suspension spring at all. Thus you wish to use the smallest rod practical. Many of the grandfather (seconds pendulum) clocks we have to repair have entirely too much metal (weight) in the rod, and a suspension that is on the stiff side.

A suspension for a rather heavy pendulum-ball is better divided, that is, two springs like those found in French clocks. The general rule for a seconds pendulum of average weight is about .60 inch. That is, total width—this is made up of two springs each .15 inch wide with the space between them .30 inch. Total length about 1.5 inches. Make clamps of brass about 3/8-inch long—this will leave some 6/8-inch for the active spring portion. Make sure that your clamps are riveted tight so that no bend takes place beyond the edge of the clamps. Likewise see that the clamps fit very snug into the clock support and

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the pendulum rod end. Any movement or bending of the spring in the clamp or of the clamp in its fittings will upset a close rate.

Once you have your clock in operation you may make this test for its isochronism adjustment. By varying the weight or driving force observe whether or not the pendulum makes the long arcs and the short arcs in the same time. If the short arcs prove to be the slower, make your suspension a trifle thinner very near its bottom end. If the short arcs are fastest, reduce the spring near the top clamp. Care must be exercised when reducing the two springs, as such reduction must be the same else your pendulum will tend to wobble.

All that is required beyond being of sufficient safe strength to support the weight of the pendulum ball in a pendulum rod is enough rigidity so as not to bend or give when the impulse is given through the crutch fork. Write to the Carpenter Steel Company, Reading, Pennsylvania, Mr. J. C. Buckley, manager Stainless Steel sales division, for Invar rod.

J. E. C.

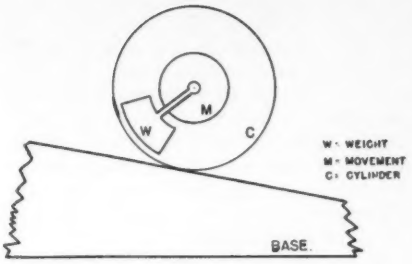
Dear Mr. Coleman:

This old timer, who is now retired and able to gratify his love of old clocks to the fullest, is building a rolling or gravity clock. As you know, all wheels and springs are removed up to the center wheel, which as a weight attached to same, in my experiments on the clock it took two hours to roll down a board three feet long, based upon that. The board would have to be about 35 feet long which, of course, is out of the question. It looks to me as if I shall have to interpose another wheel after the center wheel. If you have any suggestions I shall be delighted to receive them.

Once in awhile you get inquiries in the American Horologist and Jeweler about the Jennings Bros. Clock Company of my city. This is to advise you that the Jennings Company is no longer in business—the building is to be torn down.

JOSEPH SAMBROOK

153 Harral Avenue
Bridgeport 4, Connecticut



COASTER, INCLINED PLANE OR GRAVITY CLOCK. C.R.C.

J.E.C.'s Sketch for Sambrook

Dear Mr. Sambrook:

Placing another wheel in the train of your proposed gravity, inclined plane or coaster clock will definitely slow the roll of the cylinder (case) down; i. e., it will make less revolutions per hour and therefore travel a shorter distance in a 24-hour run.

Let's first decide on the approximate length you wish your base to be, then gear the clock accordingly. For example, say forty (40) inches long—if we allow one (1) inch for a stop on each end, the active length of your inclined plane will be thirty-eight (38) inches. If you have your cylinder revolve once per twelve (12) hours, it will have one-half of the 38 inches to do it in, or nineteen (19) inches. Nineteen inches divided by 3.14 would give you a cylinder of approximately six (6) inches' diameter. In other words, a one-day clock of this type whose cylinder turns once per twelve (12) hours, which cylinder is six (6) inches outside diameter will travel (roll down) approximately 38 inches in 24 hours.

Evidently your present clock revolves once per hour; staying with the above example of six inches diameter cylinder, the clock would have to roll or travel 38 feet instead of 38 inches to run 24 hours. We'd like to have a photo and brief description of your clock when you have finished it. Any data on the Jennings Bros. firm would be appreciated for our files.

J. E. C.

Dear Mr. Coleman:

I have a 6 V battery operated hall clock using flat ruby pallets made by the American Clock Company, movement No. B-

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10903. How often does this clock wind itself? Where can I obtain a pallet stone for it?

ALLEN CATE

Box 34
Bentonville, Indiana

Dear Mr. Cate:

First, it would be most appropriate to tell you that we have very little on these American battery driven clocks made around the turn of the century—a little has been published, another bit gleaned from advertisements plus a few notes (which I find inadequate) while handling them for repairs. We'd like to hear from readers, especially if they have any of the old instruction booklets that came with these clocks, or drawings or patent dates.

In some notes made years ago, I find that I have recorded "American Clock Company" Patent No. B-10883, 1899. Now I don't understand this letter B before the patent number, and it closely resembles your "movement No. B-10903." According to these notes, this is a straight line movement of only three wheels, the power being applied to the center wheel by a double weighted lever arrangement, whose weights are alternately wound (jerked up) thus as the falling weights drive the clock, they pass each other like your feet when you walk.

The ratchet wheel (on center post) has

seven (7) notches, thus it winds seven (7) times per hour—every seven and 4/7ths minutes. This movement is three (3) volts, not six. It was designed to run (wind) on two No. 6 dry-cell batteries. Parts (pallet jewels) haven't been available for these clocks for years. To have pallet jewels especially ground to your requirements would be out of the question because of price—why not make steel pallets? In a timepiece of the timing order of this clock, that difference between steel and jewel is very, very little. It will require some time, but a good steel pallet tempered as hard as possible with a high polish will make a serviceable and lasting job.

J. E. C.

Dear Mr. Coleman:

Is there a synchronous electric clock with a sweep seconds hand that can be reset to zero, similar to a stop watch? Will appreciate any information you may give me.

LEON Z. LAFFERTY
513 Grand Avenue
Englewood, New Jersey

Dear Mr. Lafferty:

We do not know of any synchronous electric clocks with conventional start, stop and fly-back, as in stop watches. Write to the R. W. Cramer Company, Centerbrook, Connecticut—they manufacture an excellent line of synchronous motors plus a number of special synchronous clocks.

One being a "Time Totalizer" this clock is described as a highly accurate electrically operated clock—better than .02 of 1% with a positive clutching arrangement. It has a handy reset lever permitting it to be reset when either running or stopped.

J. E. C.

Dear Mr. Coleman:

Having bought a watch at an antique sale, I would like to find out as much as I can about it. The watch is marked "D Quare London." No. 4177 fusee movement chain drive, double flag balance wheel. The movement is pinned and is in a double silver case. Enclosed is sketch of case marks.

FRANK HOLMES
Stewartsville, New Jersey

Dear Mr. Holmes:

Daniel Quare, London (1649-1724) ranks among the most celebrated English makers of watches and clocks. If you have acquired one of his genuine pieces you now own a very fine watch.

It is rather difficult to compare your sketches which you sent with the hallmarks; the year mark which you say may be G or B most nearly resembles the G for 1762. This outdates the original D. Quare by some 38 years—we could be in error about the mark, and the movement could have been re-cased. Baillie says that the numbers on watches signed by Quare are known from 233 to 4989—here your number 4177 fits.

In 1707 Quare took an apprentice named Daniel, and evidently his Christian name must have been Quare too. There is that outside possibility that your piece could have been made by this second Quare and in 1762. It was only the "great" of the watchmakers who were imitated and there is also the possibility that the piece is pure forgery.

To actually determine, within reason, whether or not a piece is by the "master" always requires a close first hand examination and comparison, taking all the angles into account. First, I'd suggest that you get three or four good photos made, preferably by a good commercial photographer who with his equipment can give you "contact" (not enlargements) prints twice actual size. One view should be of the hallmarks, another of the back plate and signature, and one under-dial shot.

I've been trying to locate a collector near you, and the closest I can find is Mr. E. E. Salomon of 606 Hamilton Street, Allentown, Pennsylvania. Map-wise you seem to be only about an inch and a half from Allentown, and my map says fourteen miles per inch—why not drive over there? I know Mr. Salomon would welcome a look-see at any piece marked "D. Quare" and he might be able to assist in some positive identification. If you have the photos made, send down a set and we'll have another go at it.

J. E. C.

Dear Mr. Coleman:

Although I am a watchmaker and only repair clocks with hairspring type balance wheels, I enjoy your column immensely. Several months past, someone sent in a formula for removing shellac from work

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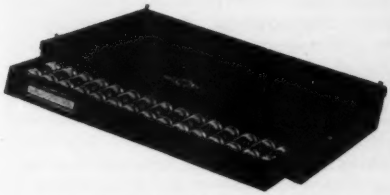

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after removing from cement chuck. I cut this out and gave it to my wife to have mixed at a pharmacy where she passed each day on her way to work. I don't know whether this was in your column or not, but feel you can supply me with the formula.

I would also like the address of a firm where I could get a small amount of hardening compound for soft or mild steel.

R. B. BLACKMON

716 Darlington Street
Columbia, South Dakota

Dear Mr. Blackmon:

We do not recall such a question to C.&O., and have made a quick check through the last year of Information Please without locating it. Britten recommends boiling the article in spirits of wine. Most lathe wax is just some form of fusable cement, generally with a high shellac content, and we've always used alcohol—naturally heating hastens the process, however one must be careful to prevent the alcohol from igniting—a chemical test tube takes care of this angle.

Write to Mr. William A. Phelps, 4106½ Glenway Avenue, Cincinnati 5, Ohio, about the "Hi-Speed-It" hardening compound he is marketing.

J. E. C.

Dear Mr. Coleman:

I am requesting information on the overhaul and timing of the 400-Day clock. Where can I get parts for the Borg auto clock? Who has chime rods for mantle 8-day clocks, and grandfather chime clocks? Have you any information on cuckoo clock repairing? (I have Goodrich's "The Modern Clock.") I will appreciate a reply or publishing answers in the Clockwise and Otherwise—you have a fine column, keep up the good work.

I also specialize in clock repairing and re-building to the trade—please mention it in your column, and thank you very much.

ROBERT L. RAYMAN

Box 9176
San Diego 9, California

Dear Mr. Rayman:

This is a pretty big order, and in a letter we can only hit the high spots, but here is a try. You say you have "The Mod-

ern Clock" by Goodrich. Turn to Chapter 6, page 91—this is good basic coverage of the 400-Day clock. Two articles appearing in the January and February issues of A.H.&J. for 1950, entitled "Year Clocks—Their Characteristics and Methods of Repair" is much longer, in detail and complete. (We believe these back issues may be had from the Book Department.)

Write to Charles Terwilliger, Box 299-A, Bronxville, New York, for information on the special tools he has for repairing 400-Day clocks and his repair-parts catalogue.

For chime rods, write: Vin Acco Time Repairs, 2221 Fowler Street, Cincinnati 6, Ohio, and for grandfather chime tubes, the A. C. Deagan Company, 1717 Berteau Avenue, Chicago, Illinois.

The answer on cuckoo clocks parallels the 400-Day above. I know of no more concise instructions than those contained in Goodrich's seventeenth chapter. Basically, the timekeeping portion of the cuckoo clock does not differ at all from the general run of pendulum clocks—this is almost true of the strike portion, naturally the cuckoo (bellows activation) has its own peculiarities, but with Goodrich's pointers and a movement in hand to verify them, this line of repairing should not present any special difficulties.

J. E. C.

Dear Mr. Coleman:

I have an eight-day spring wound Westminster chime mantel clock about which I would like some information. It is German with the trade mark of a lion and under this the letters U. M. It has only two springs, one time and one for both strike and chime. The problem is, it only chimes on the quarters, on the hour it does not chime but just strikes the hour. You see the chiming cylinder moves out of action at the hour and the outer pins contact the hour strike hammer. By the first quarter the cylinder moves back in place, but the tune is not the conventional Westminster first quarter, neither are the other quarters as usual, and it takes three or four hours before it returns to the proper tune.

Is this a usual arrangement for this two-spring clock? Mechanically I can't see how it can be otherwise for the minute or reducing wheel carries the pin that moves the lever that shifts the chime pin barrel. Even if it does chime the fourth quarter before the hour strike, it still would not be the right tune on the following first quarter.

I would very much appreciate your opinion and advice on this clock. Is there something I should correct or leave as is? It has moon dial and calendar, parts all nicely finished and appears to be rather a good clock. About all the present owner knows is that it won't run. Thank you very much.

ERNEST E. BIEN

124 High Street
Sharon Hill, Pennsylvania

Dear Mr. Bien:

The basic thought behind the construction of all these two-train chiming clocks was to produce a chiming clock cheaper. You can readily see that not requiring that third mainspring and train, the factory could easily produce a movement much cheaper than the orthodox Westminster chime with three trains — the jeweler could offer his chime buying customer a chiming clock at a lower price.

Some of these two train German chimes were full Westminster chimers, i.e. they chimed one chord on the first quarter, two chords on the half (second quarter) hour, three chords on the three-quarter (45 minutes) and four chords on the hour, then the full hour stroke. These clocks of necessity had to have the shift (from chime to strike) on the chime drum, at the end of the fourth quarter.

Others were "cheaters"; i.e. the shifting was done by a pin in the hour wheel at some time between 45 minutes and the hour, and when it tripped at the hour it only struck the hour stroke, omitting (cheating out) entirely any chiming on the hour. A quick examination will immediately determine whether or not the movement is intended for a full chime, or is a "cheater." Evidently the movement in question is one of those that cheats its owner out of the hour chime.

Some of the better "cheaters" have the correct Westminster chime set up on its chime barrel so that the barrel has completed its full revolution at the end of the third chord at the three-quarter chime.

In this way when it comes back into action at the first quarter it has to start with the proper four notes for the first quarter. We've seen a few of the poorer quality "cheaters" whose chime barrel did not make sense, and it simply gives the correct number of notes each time it chimes but does not, and can not, adhere to a regular hourly pattern.

Mark your chime barrel—start with the hour stroke and take the minute hand through one hour, after the chime barrel has operated through its hour-cycle, in your case, has chimed the first, second and third quarter, and note your mark. If the barrel has not made exactly one revolution, then the clock cannot follow an hourly pattern. See answer, December, 1953, issue, page 35, Mr. Norman Fellencer, for the correct Westminster chime.

J. E. C.

Dear Mr. Coleman:

I am informed you would probably know where I could procure clock movement to place in a grandfather clock cabinet which I intend to make. I desire a movement operated by three weights, brass or bronze covered, and pendulum, to strike the hour, half hour and quarter hour, or chimes. Face to be about 10 or 12 inches in diameter of transparent glass with numerals so I can place an electric light behind it for a night light, enabling me to tell the time at night.

If you know of any dealer or manufacturer, preferably here in the West, will you kindly mail this on to him? This would save me time since I would like to start on the cabinet, but cannot until I have the dimensions. Your assistance in this matter will be greatly appreciated.

ARTHUR B. NAFZIGER

E. 304 Poplar
Colfax, Washington

Dear Mr. Nafziger:

Write to the A. C. Becken Company, Steel Block, Denver, Colorado; The Kuempel Chime Clock Company, 3611 Brunswick Avenue, Minneapolis 16, Minnesota; and R. W. Holwick, 177 South Anacapa Street, Ventura, California.

We are reasonably sure that you are not going to locate any movements already equipped with a glass dial—what you will have to do is buy the movement, less dial,

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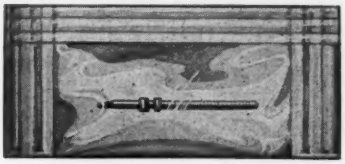

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and have this type dial made up (see advertisements in A.H.&J. for dial makers). Further, we know from experience you will have to keep this back-lighting feature in mind when selecting a movement. With the ordinary movement on which the dial fits fairly close to the front plate, it is next to impossible to illuminate the dial from the back. Obtain a movement with the longest possible center post to enable you to mount your dial forward of the front plate far enough to get cross-lighting behind the dial.

Have this dial made of glass—we've had some sad experiences with plastics. If your movement is the chain-pull-wind type no key holes are required for winding—the same goes for the second hand. No second hand and no winding squares also makes for better back-lighting, as well as less holes to drill in the glass. This type of dial requires painting reversed on the back; i.e. the black numerals are first painted backwards on the glass then the whole back is coated with a translucent white. By day you have a fine dial closely resembling a fired enamel job, while at night with the back-lighting you get a very pleasing illuminated dial.

J. E. C.

Dear Mr. Coleman:

I have been a reader of your Clockwise & Otherwise column for several years and it goes without saying your articles, along with the entire magazine, are very interesting, informative, and helpful in solving problems. I have one of my own now.

I remember reading a lengthy feature on the repair of the 400-Day clock, and also one on the Atmos clock. I am unable to locate the magazine in which the article appeared. Would you please tell me which magazines they are in, or better, if it is possible please mail us the issues of the A.H.&J. in which the articles appear and we will gladly pay the expense involved.

Would you please tell us the melting point of various solders used in jewelry repair work?

WILLIAM E. BUCK

425 Coatsville Avenue
Salt Lake City 4, Utah

Dear Mr. Buck:

The article you have in mind is "Year Clocks—Their Characteristics and Methods of Repair," and it ran in the January and February, 1950 issues. "How to Repair Atmos—the Perpetual Motion Clock" ran in the June 1952 issue. I do not have these back issues at hand, but will see what can be done towards getting the information into your hands.

I must say we are primarily concerned with clocks and clock repairing, and have precious little data on jewelry repairing. A reference to Bowman's and De Carle's dictionaries does not reveal the melting point of solders and neither does a little volume devoted wholly to jewelry work. Strictly speaking, the melting point of solders varies with the special combination of metals going into that solder. As we understand it, the manufacture of solder is rather intricate, at least different manufacturers may have their own special combinations. Take for example "soft" solder (lead)—while there are several combinations, there are actually two "half and half" solders, that is, half tin and half lead. The common "half and half" is generally made from "reclaimed" metals, while that designated as "strictly half and half" is made from virgin tin and virgin lead. Actually the melting point of the common "half and half" is quite a bit higher than that of the "strictly half and half."

Van Nostrand's "Scientific Encyclopedia" says: "With the exception of certain glassy or resinous substances devoid of crystal structure and some that are chemically unstable, every *pure* substance has a more or less well defined melting point."

Aluminum melts at 657 degrees centigrade, copper at 1084C., gold at 1063C., iron at 1535C., lead at 327C., platinum at 1755C., silver at 960C., tin at 232C., and zinc at 419C. It would be safe to judge the melting points of solders for these metals to be just slightly below the melting point of the metal itself. A letter directed to Handy & Harman, 82 Fulton Street, New York 38, New York, one of the country's largest manufacturers of karat gold and gold solders, would bring something along the desired line.

J. E. C.

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Dear J. E.:

I have an old clock a friend wishes to get technical data on which I just repaired for him. Ives & Lewis, one-day wood movement. I told my friend you could give me the information as to date built, etc. Come down to see me, the fishing no good, but I will show you around.

Box 815 V. E. SEMONES
Venice, Florida

Dear Vick:

Drepperd's list catalogs Ives & Lewis, Bristol, Connecticut, 1819 to 1823. Sounds as if it might be a long case clock although you do not state whether l. c. or shelf type. If mantel, then it has a label, and if practical I'd appreciate a copy of the wording of that label, plus the printer (lower right corner) on it.

The Ives family was a powerful factor in early clock manufacture and figured in some 16 or 18 firms at various dates from about 1808 to 1862. The six famous Ives brothers were Ira, 1775-1848; Amasa, 1777-1817; Philo, 1780-1822; Joseph, 1782-1862; Shaylor, 1785-1840; Chauncey, 1787-1857. Philo was the father of Lawson C. and Philander, which sons followed him in the clock manufacturing business. Ira and Shaylor received two patents each and Joseph seven patents.

Give me a "rain-check" on that invitation to Venice, not because the fish aren't biting because I don't care to fish anyway, but I just can't get away right now. I have enclosed a self-addressed envelope if it is practical to copy that label.

J. E. C.

Dear Mr. Coleman:

We have been referred to you by Mr. Joseph Smith of Crestline, California. We have a customer who is making three mercury barometers and is anxious to obtain hands for same. Would like to get one 4-inch hand for 8-inch dial and one counterbalanced hand. Would like six sets, filigree if possible. Our resale number is G 5413. EDWIN H. KOCHER

Kocher's Jewelry
169 South First Street
San Jose 13, California

Dear Mr. Kocher:

For all types of parts and repairs for barometers write to John W. Bennett, 248 South B Avenue, Old Greenwich, Connecticut. They are specialists in the barometer line and can supply any part required.

J. E. C.

Dear Mr. Coleman:

In regard to a question asked by Mr. Floyd L. Stone of Albuquerque, New Mexico, I am sending you a clipping from Sunday, December 20, 1953 issue of the St. Louis Globe Democrat. Thought this might help some in your column as I appreciate it very much. This was in the September issue of A.H.&J., page 36.

They did just what you said, for at this writing I have one of their watches for repair, but this watch is an Elgin,

serial number 8494072 17J and is grade No. 159. Everything checks to this grade, Elgin staff, h. s. and the m. s., even has Enlo as if it were the original, but "Standard, St Louis" is engraved on the movement. Can you tell me about when this watch was made?

I also have an English fusee made by Jos. Johnson, 25 Church Street, Liverpool, England, serial No. 24237; this watch has conventional lever escapement 19J, jeweled fusee, upper end stone is diamond and lower goes in on a slide. The hairspring is under the balance and the balance does not have balance screws. Can you tell me if this is a collector's item and about how old it is? The watch is in good running order and keeps good time.

J. C. FREEMAN

227 Main Street
Macon, Missouri

Dear Mr. Freeman:

Thank you for your cooperation, we appreciate it. Roughly, Elgin watches serially numbered from eight million to nine million, came out during the years 1899 and 1900.

Joseph Johnson, Liverpool, is listed as being active 1800 to 1829. We believe that there are about a dozen Joseph Johnson pieces in the James Arthur collection at New York University, however, we do not know whether or not they have any specific information on their dates. If they have, then perhaps some comparison of your serial number against the serial numbers of theirs would provide a clue.

Naturally there is some demand for watches as old as your Johnson, but they are pretty plentiful. See page 34, the December 1952 A.H.&J. for the article by Professor Willis I. Milham titled: "When Is a Timekeeper a Collector's Item?"

J. E. C.

Dear Mr. Coleman:

I have been told that you might be able to tell me something about a clock I own. It is a four-wheel wooden clock, the escapement and lever is made like the yoke of oxen, and it has one weight. In the center of the clock is a picture of Columbus and below, 1492.

I am interested in its age, and although the front of the clock is there, the outer case is missing. If you can help me any with what little information I have given you, I will appreciate it very much.

MRS. E. W. MILES

R. F. D. No. 1
Woodstock, Georgia

Dear Mrs. Miles:

Though brief, your description indicates one of the Columbian Exposition novelty clocks. The front of these clocks measures about 13 inches from top point to bottom point and the dial has an outside diameter of 5½ inches—there is a profile of Columbus at the top and under it the word "Columbus." Under the dial is the word "Anno" and "1492."

Practically all of these type clocks in circulation were made by Bostwick & Burgess Manufacturing Company of Norwalk, Ohio, and sold at the Columbian Exposition in Chicago—about 7000 in all. Priced from $5.00 down to $1.00. A few were given as prizes by a theatre in 1894 and a few have been individually handmade, conservative estimate places these at less than 500.

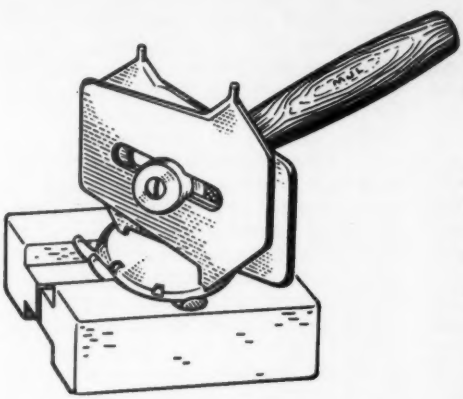
In 1945 Professor Willis I. Milham wrote and produced a 40-page booklet entitled "The Columbus Clock"—it is well illustrated and I quote its first paragraph: "The Columbus Clock may be called the clock of mystery since there are more stories about who made it and more uncertainty about its history than about almost any other clock. The purpose of this booklet is to remove some of this mystery."

You may obtain copies of this booklet from the Book Department, American Horologist & Jeweler, P. O. Box 7127, Capitol Hill Station, Denver 6, Colorado for $1.00 each. You mention that the outer case is missing—these clocks never had cases, they go just hanging on the wall.

J. E. C.

Dear Mr. Coleman:

I have several questions to ask and would like you to reply. 1. Is it harmful to mainsprings to clean them in the cleaning machine? 2. Is it proper that instead of doing the aforementioned, to wipe off the mainspring with oiled watch paper, and at the same time stretch out the mainspring



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during this operation as you might imagine it, and then again, using fresh watch paper, to go over it wiping off the excess oil, in preparing the mainspring for entry into the barrel? 3. I came across a large movement which I know has few identifying marks available, but would like to ask you if they have some meaning to you for identification. They are as follows: Round pocket size (Diameter size). Has No. 33585 on bridge, lever set, Swiss (on bridge), "40" on movement.

SAMUEL SILVERMAN
1207 Farragut Street, N. W.
Washington 11, D. C.

Dear Mr. Silverman:

We can't possibly see where any harm can come from cleaning the mainspring in the cleaning machine, in fact, think this is the way it ought to be done. Reasonable care must be taken with each and every operation, so also with the mainspring. It's the abuse of the method, not the use of it, that brings trouble.

Nowadays, we see but few workmen use a winder to replace the spring in the barrel and almost none who use it to take the spring out. With some very shallow barrels of a pretty good diameter it may be okay to just pull the spring out gently, but there are springs where the diameter of the barrel is small in proportion to the depth (width of the spring) where the winder should be used to remove the spring. This is especially true with many clocks, particularly the 400-Days, French and like barrels, as found in chronometers.

No mainspring, watch or clock, regardless of how heavy it may be should receive rough treatment and above all must not be kinked or nicked by handling with pliers. As I understand you, the mainspring will be gently removed from its barrel, placed (fully uncoiled, but not straightened out) in the cleaning basket, and given the regular cleaning and drying and then properly replaced with winder.

It's a great big question whether or not straightening a spring out to wipe it is injurious to it—personally, I don't think so. But there is no question about the cleaning qualities of this oil-wipe method; for a certainty every bit of the old and contaminated lubrication is not removed thereby. What remains just hastens the deterioration of the fresh lubricant you may apply. The machine cleaning removes every particle of the old oil and you are replacing the spring chemically clean.

Occasionally, we see these extra large Swiss pieces, but would have to have more information for any sort of identification.

J. E. C.

Tennessee Sour Mash Clock

(Only J. E. Coleman could engineer such a novel gift as this—a Christmas present to Mr. and Mrs. Orville R. Hagans. The following letter by Coleman, which accompanied the gift, explains the reason for the creation of the unique clock.—Ed. note.)

Christmas, 1953

Dear Jo and Orville:

Comes that season when one would really like some conversation. Since the miles between Colorado and Tennessee prevent the best kind, that via postage stamp is the only method left.

So, you'd like to send your friends a little Christmas memento; fine old custom. You'll be thinking of them at this season of good fellowship and good will, but—the $64 question . . . what the heck will it be?

Why, something they like of course—clocks, that's it! But say, they already have more clocks than any three couples you know—and besides, they have more lettuce (that green stuff that buys things) than Carter has little pills; they can buy the very clock they want and pay more for it than you will ever be able to put out for a mere timepiece and think no more of the transaction than you do of buying a postage stamp.

That's out, brother—you simply can't step out and buy them a clock that'll tickle their fancy; not even if you skip the payment on the car, the income tax and the mortgage for the first quarter of '54, to do it.

Listen, Bub—how about a little hand work? Put some thought and effort into it; a part of yourself, that's what they'll really like—the personal touch. It gets away from the commercial side and what could better convey the real spirit. Okay, Doctor, I'm a clockmaker—I'll just make a clock.

The Tennessee Sour Mash Clock Graces the Hagans' Mountain Home

We Tennesseeans are a frugal people—believe in making the best use of all handy material. How about that "corn squeezings" barrel over there? In Tennessee they make the finest White Corn Likker in the whole world. No offense to George Martin and his fellow Kentuckians—they just make bourbon up there. Know what's a fact? That there barrel over there is one of the reasons our "white corn" excells all others—you see, it puts on the finishing touches.

While waiting for the mash to sour you go up on the side of the hill and cut a few of those sturdy Tennessee white oaks—they make the finest barrels and kegs in the world. We Tennesseeans are pretty good coopers too, sort of a side line. Matter of necessity 'cause you have to have something to catch that "run" in—just a little back-breaking labor and a few hoops, and there you have one of those famous white oak barrels.

While this is all going forward, the Little Woman has her best chopping axe in action down a bit nearer the foot of the hill where the good hickory grows. To the casual observer she might have been getting the winter's supply of fuel, but not on your life—those hickory back-sticks will never grace a fireplace. They'll every one go right into that big ditch over there, set on fire and covered with dirt—a more or less primitive process but another Tennessee first because it produces the world's best charcoal.

Why charcoal? Well, just a few shovels of live coals into the oak barrels until it chars about one-third of the inner thickness of the staves and results in the finest known method of aging corn likker—the char absorbs fusel oil and aids Mother Nature in the aging.

We won't go into what happened for the next few years, but eventually someone realizes he has upon his hands the very finest possible barrel, empty—entirely

too good to be pitched upon the dump like those city fellers do their tin cans. Among those of us who are used to the problem, have seen these fine, sturdy barrels used for just about everything except watch charms. There is nothing better for catching rain water; cut one in half (the long way) and you have a fine flower box for the front porch and a good watering trough for the barn lot at one shot. Saw 'em in half across the other way and they make good setting chairs. Why, no country store is in style if it hasn't one (whole) for a card table—a most substantial one, too. There are ten thousand ways to use these empty barrels—even after a hundred or so years when they've rotted and fallen apart we give the hoops to the kids to roll.

If they are good for just about everything, why won't one make a good clock? Paint your dial on the head, hang it on the wall and by cracky, there it is—the real McCoy. Hope you like the "Tennessee Sour Mash Clock."

J. E. COLEMAN

IMPORTERS GIVE OPINIONS ON UNBREAKABLE MAINSPRINGS

The Watch Material Distributors Association considers as extremely serious the question of how far to go into the field of unbreakable mainsprings. Because of the difference of opinion regarding the question, the Association asked each of the major importers to tell of their plans for the future. Following are excerpts from their reports:

Importer A: "We are planning to go into the unbreakable field, but the swing-over will be a very slow project. We will have approximately 12 numbers ready in the early spring, provided there are no further difficulties. These probably will sell in the same price range as the present Elgin and Hamilton springs. However, we must, of necessity, proceed with caution."

Importer B: "The Swiss mainspring manufacturers are apprehensive that the success of white mainsprings may result in the elimination of steel mainspring manufacturing business in due time. A great many watch manufacturers in Switzerland have placed white mainsprings in new watches, and repair men have endeavored to replace these when the watches were brought in for repair, thus creating a demand. To the best of my knowledge, the metal for white mainsprings is not freely available for the manufacture of mainsprings for repair purposes. In addition, the metal is so expensive and the processing of the metal takes so much longer, that there is not too much encouragement for the manufacture of these mainsprings in large quantities for repair purposes. I have given careful consideration and study to the subject and, because of requests from the trade, it is only a matter of time before we will offer some kind of assortment with white mainsprings for repair purposes. I believe only time can tell if the white mainsprings for repair purposes are here to stay. In addition, there is a certain steel soon to be available for mainsprings which is claimed to be as effective as white mainsprings from a point of view of resistance to rust and breakage. Up to now, this steel has not been released for general use."

Importer C: "Although it would seem to be a case of 'killing the goose that laid the golden egg,' it would appear that we will have to go into unbreakable mainsprings in the near future. Without a doubt this will mean the decrease of the sale of some of our regular springs in the more popular sizes. Due to their great cost, it would be impossible for any importer to put in a complete line of these springs as our selling price would have to be approximately $5 to $5.50 per dozen, depending upon the complete cost after arrival. Our factory advises us that it would be the best to import these springs and sell them by caliber number and not by size. The power of the unbreakable mainspring is different from that of a regular mainspring and consequently a watch that would take a 7x10x10½ regular mainspring will not take the same size in the unbreakable, as it would be much too powerful for the watch. We feel that since some of the importers have already imported this mainspring, that it will also be necessary for us to do so, although we hesitate because of our good business on the regular springs."

Importer D: "This is an item that we would have liked to have kept away from, for the main reason that after the jobbers

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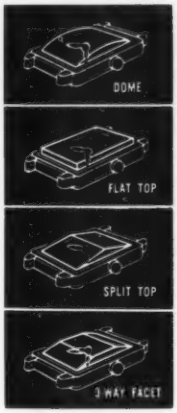

Presco Watch Crystal Co. 27 Eldridge Street New York 2, N. Y.

have a stock of these for about two years, even though the price will be considerably higher than the regular spring, the mainspring business throughout the United States will be about half of what it is now. It is my understanding that the life of these springs is anywhere from six to twelve years, while the regular spring, as far as its life is concerned, is indefinite, which could be from one day to any figure you care to mention."

Importer E: "It seems there is a market for this product. We have placed an order abroad, and we hope to arrive at a satisfactory price arrangement with our mainspring manufacturer so that we may notify the trade very shortly. Mainspring manufacturers for some time were loathe to go into the manufacture of these springs, as they feared it would spoil their mainspring business, but they now have come to the realization that progress cannot be stopped. Elgin and Hamilton have had fine success in selling their 'unbreakable' mainsprings, and now Bulova is advertising that their watches are being equipped with their type of alloy springs. There is another spring which, while not rust-proof, should retain its resiliency under ordinary conditions for about 10 years. We shortly will announce receipt of the shipment of such springs at a normal price. However, the white alloy springs will be high in price, as the new samples we had are high. It is our belief that there will be a rather large demand for the carbon steel mainsprings with a guarantee against breakage. There will also be a demand from the first-class jewelers for the white alloy mainsprings."

(In its press release, the Association noted that one of the importers had just issued a list of 24 unbreakable mainsprings at a moderate price.)

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THE WATCH REPAIRMAN AND THE OSCILLOSCOPE

By Carl H. Anderson

AS WATCH repairmen working every day at the bench we are as much interested in the chemical and technical aspects of an oil as we are in the practical results To be sure, we are interested in the viscosity, flash point, acidity, sulphur content, spreading quality, adhesiveness, cohesiveness, contact tension, surface tension, whether it is of mineral, animal, vegetable or synthetic composition, evaporation, oiliness, length of life and a whole lot of other things about the oil we use, but we are not chemical engineers or technicians, we are only watch repairmen. We believe most of us are interested primarily in whether or not the oil does the job it is supposed to do and if it stands up and lasts out our repair guarantee period of time. We could go into all these technicalities, but how many of us would know any more after we had finished it than we did before we started, so let us stick to the practical side of the oil situation for the present and see what the actual results are in everyday use all over the U. S.

If you really want to know all about watch oils, we suggest you buy and read a copy of "Les Huiles en Horlogerie. Le Probleme Des Lubricants" by E. Magron. It was published in Bienne, Switzerland in 1930, 290 pages with 120 illustrations and 12 graphs. This is the best book in existence on watch oils. It covers everything from A to Z.

Since this oil failure situation has been going on for lo, these many years, we have conducted a little private investigation of our own amongst watch repairmen all over the U. S., and have replies from every state in the Union. We did not know there were so many different oils and rinse solutions in use. We have tabulated the results in the table herewith. Bear in mind that every one of these watch repairmen has reported oil failure during the past five years. We have tabulated 2,923 of these cases into twelve different brands of oil and twelve different brands of rinse solutions. We have indicated the oils as "A," "B," and so on to "L," and the rinse solutions as 1, 2 and so on to 12. Here we have the results of twelve different oils used with twelve different rinse solutions. For example, by referring to the table we find there were 251 users of oil "A" that reported failures with rinse solution No. 1. Reading on down the column there were 105 using oil "A" with rinse solution No. 2, 101 using oil "A" with rinse solution No. 3 and so on.

There were 647 using oil "A", 526 using oil "B," 747 using oil "C" and so on. 824 using rinse solution No. 1, 441 using rinse solution No. 2, 460 using rinse solution No. 3 and so on. Read the table vertically to get the oils and horizontally for the rinse solutions. Where zeros appear in the squares we did not have any report from anyone who was using that combination of oil and rinse solution. From this tabulation it proves positively that no matter what combination of the twelve different oils with the twelve different rinse solutions was used, they all reported oil failures. To our mind this proves conclusively that the rinse solution tin can is to blame for the oil failures, else certainly some would have found the combination of oil and rinse solution that would not fail in actual use. We either talked personally with the 2,923 who reported or had personal correspondence with them. Yes, it was quite

Mr. Anderson will be glad to answer any question pertaining to the Oscilloscope. Queries should be sent to him in care of the American Horologist & Jeweler, with a stamped return envelope enclosed.

RINSES	OIL A	B	C	D	E	F	G	H	I	J	K	L	Total
1	251	113	302	57	18	44	12	9	3	2	5	8	824
2	105	111	127	34	21	15	4	12	5	1	4	2	441
3	101	133	94	56	7	22	17	5	10	5	3	7	460
4	52	60	71	44	22	9	31	12	8	7	9	1	326
5	31	19	42	15	27	10	19	0	11	4	2	0	180
6	41	17	26	31	6	21	17	5	13	4	0	5	186
7	14	23	39	17	15	8	0	19	0	3	2	4	144
8	5	3	12	4	9	0	11	2	7	8	3	3	67
9	19	16	14	12	3	5	2	9	3	0	0	1	84
10	11	10	9	13	2	8	7	5	0	1	3	2	71
11	3	2	4	1	0	5	2	0	0	0	1	1	19
12	14	19	7	1	15	7	9	11	9	5	2	2	121
Total	647	526	747	305	145	154	131	89	69	40	34	36	2923

Oil and Rinse Experiment Table

THE OSCILLOSCOPE—Continued

a task, but we feel the results well paid the expense involved.

To all of the 2,923 we either told them personally or wrote them about our experience using a rinse of half-benzol and half-carbon tetrachloride. We asked them to at least give it a trial and report the results. Here is the score of those who have used this suggestion for the past two or more years: Oil "A" 167, Oil "B" 191, Oil "C" 184, "D" 196, "E" 105, "F" 92, "G" 88, "H" 62, "I" 40, "J" 32, "K" 18 and "L" 24, or a total of 1,199. They were asked to use the same bottle of oil they had been using when they had oil failures, to clean their watches the same as they had always done and after they had made at least a two-year test to please give us their results. 1,197 reported *no oil failures* on watches that had been out one year or more, and 2 reported oil failure. We checked into the two who had oil failures and found they had bought their benzol and carbon tetrachloride from local drug stores instead of a reliable wholesale chemical company.

When we pinned the druggists down they admitted they were buying both of these chemicals themselves in one gallon tin cans and when the watchmakers had asked for them in glass jugs, they had emptied the contents of the tin cans into glass jugs before making delivery. So here again the tin can entered the picture and you can add two to your score against soft soldered seam tin cans.

We are not finding fault with tin cans as such, but we do not believe the ordinary tin can is the right receptacle for a watch rinse solution. We buy ours from a reliable wholesale chemical company who receive their supplies in 55-gallon steel drums where no solder or soldering flux is used and they do not allow any of their chemicals to become contaminated in any way, as they do the bulk of their business with large companies who have their own chemists and chemical laboratories who run laboratory tests on everything they buy before putting it into process of manufacture out in their plants. If you want to be sure of receiving your benzol and carbon tetrachloride uncontaminated and in good chemical condition, here is how to get it. Take the yellow pages of the telephone directory of any large city, and look up chemical companies. Call them on the phone, ask them if they handle benzol and carbon tetrachloride. Be sure to ask

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how they buy it, if they get their stocks in small quantities or in the original manufacturer's 55-gallon steel drum direct from the manufacturer. Also ask if they will sell you in one or five gallon lots, single gallons in glass jugs (you can always pick up some old Coca Cola glass jugs at a drug store or soda fountain for about ten cents each if they do not already have some of the others).

Most wholesale chemical companies have five and ten gallon welded steel drums for which they will charge you, but will make full refund when the drums are returned in good, usable condition. You probably will not wish to return these small drums as you can use them over and over, and there is nothing in either of these chemicals to spoil the drums or cause them to rust out. So far as we know benzol comes in only one grade, while carbon tetrachloride is available in three grades: commercial, technical and chemically pure. The commercial is the cheapest, technical costs a little more and the chemically pure is quite a great deal more. You do not need to buy the best grade; either the commercial or technical will answer your purposes very nicely.

For ourselves, we buy technical in five gallon lots, packed in one gallon glass jugs. If you try out our suggestion, we would be very glad to hear from you with your opinion of the results. Notice that whatever oil you may use, that it does not spread when you are using this rinse solution. After a year you will find the oil to be still liquid and in good condition. If you are a skeptic and doubt all this, take a half-dozen or so of your old trade-in, "klunkers" or anything that can be made to run, give them the usual cleaning, using this rinse solution, oil them with your usual oil, then keep them running for at least a year and note the results. If you have an oscilloscope, you can check these "guinea pigs" every month in less than one minute for each watch and know exactly whether any oil change is taking place or not.

● ● ●

This has turned out to be a much longer article that we had originally intended or thought it would be. But—we do know one thing, our suggestion is worth trying. In any event, you can not be any worse

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off than you have already been in the past, so any improvement, no matter how small, is just that much gained, is it not?

This then is our New Year's Greeting and present to you. We know it is a really worthwhile present, if you will give our suggestions a fair trial.

If you are interested in viscosity, flash point, surface tension, contact tension, spreading and the other technical aspects of oil, drop us a line and say so and we will include these things in later articles.

Remember one thing, though, we make absolutely no recommendations, nor do we condemn any brand of watch oil, rinse solution or make of cleaning machine. We have used almost all of the popular or best selling brands of oils and rinse solutions on the market and believe they are all good. All we have to say is that we absolutely believe rinse solutions should not be shipped in soldered tin cans, therefore there would be no need for the oil refineries to include an inhibitor and no soft solder flux could possibly contaminate the rinse solution. If you have any suggestions or comments, we will welcome them most heartily.

We particularly would like to hear from any who do not agree with our viewpoints. We do not set ourselves up as experts, we work at the watch bench every working day just the same as you do and have the same watch problems confronting us that confront you. We do not make the positive statement that we have found the solution to the oil failure problem for every watch repairman, but we do say and can prove that the methods we are using are producing entirely satisfactory results not only for ourselves but all others who are following our suggestions.

• • •

OIL FAILURE, the source of trouble for thousands of watch repairmen.

Oil failure, probably the most cussed and discussed topic in the entire science of horology.

Oil itself, one of the most misunderstood and wrongfully handled items in all of watch repairing.

The watch repairman at the bench is not supposed to be a chemical engineer, neither is he supposed to know all the needed, good and bad qualities of oil. All he is supposed to know is that the oil he is using is good and will do the job he needs done. So with that idea in mind, we will proceed to give you some much-needed information, with as few technicalities as possible.

Let it be thoroughly understood in the beginning that we neither recommend nor condemn any cleaning process, cleaning machine, cleaning or rinse solution. We leave it entirely up to you to form your own conclusions.

Right now we have on hand eighteen different brands of oil. Some of them in as many as eight different viscosities in one brand of oil. They are: Nye, Fulcrum, Moebius, Sine Dolo, Black Shield, Elgin M56B, Hamilton PML79, La Perle, Kelly, Microtime, Newman, Burton, Cuypers, Novastor, Chronax, V. T. F., Breguet and Stoll. These were all purchased through the usual channels from material dealers without any comment that they were to be used for test purposes.

We have selected some of our own watches, which we will very carefully clean, peg and swab all jewel surfaces and holes. Then we will assemble and adjust each one of these watches using a different make and viscosity oil on each one of them. We are making oscillograms in six positions of each watch both before and after cleaning. We will then subject the watches to a running test to continue until each watch stops of its own accord, whether or not it takes one, two, three, four or five years to do so.

Once a month thereafter we will examine these watches with the oscilloscope and report our findings. If any change in oil condition is found we will so report it, showing oscillograms of the changed condition.

In cleaning these watches we will use a foam type cleaning solution very similar to the oleic acid, acetone, ammonia formula given later in this department. We will use a cleaning machine with three jars and automatic reversing action. The rinse solutions will be half-and-half benzol and carbon tetrachloride. There will be two rinse jars, each filled with the same rinse solution. The watches will be run about five minutes in each solution and dried with a preheated dryer.

We are now experimenting with using various oils in the same watch, to determine the effects of each different oil, such as a change in timing rate, balance arc, pivot slap, amount of impulse given the lever; position, temperature and isochronal rates; oiling and not oiling various parts of the watch such as the pallet arbor pivots, changes in the time of the entire escapement action, changes in unlocking time, changes in unlocking resistance, changes in impulse time and force, changes in drop time, changes in lock time, changes in the force of draw, changes in draw time, changes in lever rebound time and force from the banking pin after impulse, changes in rebound of the lever when the roller jewel first strikes the fork slot at entry. In fact, a complete study of everything affecting the entire escapement by the use of different oils. Oscillograms are being made of each of these changes and many highly important and interesting things have been observed and duly noted. We do not say we are the first to ever make such a study, but we may be the first to publish a report of such findings.

What we are after are *facts*, not fancy. We must have demonstrative truths which can be proven even to the most biased or prejudiced person. Anyone who has only the very lowest rudimentary knowledge of the situation will readily admit that such a study is made possible only by the use of an oscilloscope. It could not possibly be accomplished by any other method.

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We know you have spent many tedious hours working on watches bringing them to an acceptable variation in position rates only to have your customers bring them back with the complaint they were not keeping satisfactory time. Did you fail some place along the line? *Yes, you did!* How? By not knowing what effect over- or under-oiling or wrong viscosity would have on the time rate. We have spent thousands of hours searching for the answers to these and other problems. We leave it to your judgment whether or not the answer has been found. But—do not overlook one very highly important item—it is these very little things which defeat all your laborious efforts.

To oil or not to oil certain parts of a

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watch has been a very highly debatable question. There are those who claim that since the total movement of the pallet arbor pivots in their jewel holes is only 10°, oil should not be applied to them. Here they have a point, or at least believe they have. But, there is another point in mechanics which says any two surfaces which come together in a rubbing or frictional contact should be oiled. We oil our pallet arbor pivots and use the same rule for the amount of oil as we do in oiling other pivots. It is quite interesting to say the least to compare oscillograms of the same watch where the pallet arbor pivots were oiled in one case and not oiled in the other. But then, this is a long subject and it will require two or three articles later on to enable you to arrive at your own satisfactory answer.

Another debatable point, to oil or not to oil the center pinion where the cannon pinion fits on. What do you do? We oil ours. Why? Will tell you later.

To our way of thinking, the ideal watch cleaning machine would be an automatic reversing motor and at least four *square* (not round) jars. Beyond all question, if you are going to use a watch cleaning machine, the basket should be reversed many times while in each jar. If the cleaning and rinse solutions are to penetrate every little hole then the solutions should change their direction of flow. If you must have a reversing action in a washing machine for clothes, then why isn't it just as essential in washing a watch, for that is exactly what you actually do, the parts being washed while in each jar. To sit there for fifteen to twenty minutes flipping a switch to reverse the basket means that much time lost. If the reversing action is automatic you can go ahead with other work while the basket is in each jar.

Square jars versus round jars? Very simple. Round jars usually have only one baffle rod. If you will watch the action of the solution in such a round jar (regardless of whether the basket is being rotated clockwise or counter clockwise), you will see an eddy and the direction of movement of the solution is not entirely broken up by the one baffle. Square jars do not require baffles as the four corners act as baffles. The direction of flow of the solution is broken up four times to one time for the round jar.

Four jars versus three jars? A four-jar cleaning machine gives you three jars for rinse solution instead of two. This extra jar of rinse solution is highly desirable if you want to do good work. We sometimes think we would like to have a cleaning machine with seven jars, using one of the extra jars for a cyanide solution, the second for rinse water and the third for alcohol to take out the rinse water. We find many watches with tarnished plates that really should be cyanided. Some day some enterprising manufacturer may make such a cleaning machine.

We definitely recommend the thorough pegging and swabbing of every jewel surface and jewel hole as well as the pithing of every pinion. This very materially reduces the probability of any unseen microscopic film being left on any of these surfaces.

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Should a watch be oiled lightly, medium or heavy? Another question which has been the subject of much debate. While we were technical director of one of the large horological schools we taught the very lightest oiling—a ring of oil, just barely visible with a loupe, between the pivot and the jewel hole. Of course these were watches being worked on by the students and the students were usually out of school before they had time for oil failures. Hamilton in their instruction sheet accompanying their PML79 oil say to use enough oil so as to fill the oil sink in the jewel so it is one-fourth to one-half full. This is the rule we follow. Where cap jewels are used, a ring of oil at least half the diameter of the cap jewel is best.

On ladies' watches and jewels with a twelve-hole or smaller we use an imported French hard pegwood much resembling orangewood. It is a little larger in diameter than a standard lead in a wood lead pencil. We use a cut six, eight-inch flat file to sharpen our pegwood. We lay the pegwood across our fingers on the palm side of our hand, rolling the pegwood backward and forward with our thumb while filing the exposed end of the pegwood with the file. We believe this to be

better than sharpening the pegwood with a knife as it is quite difficult to get the point small enough for a seven, eight or nine jewel hole. Since this pegwood is very hard, the file leaves a very fine dust on the conical point of the pegwood. We roll the point between our thumb and finger which removes the dust. Then after cleaning the jewel holes we use a blower to blow off any possible dust or lint.

We apply our oil directly in the jewel hole from the flat side of train jewels and the curved side of balance jewels, or in other words *not* in the oil sink of the jewel. We use a fountain oiler which we make ourselves from a glass tube very similar to a thermometer tube. We hold the glass tube over an alcohol lamp until the glass is red hot, then we draw out the end. We have these oilers with tips drawn down until the tip goes completely through a seven jewel hole.

Since this pegwood is very hard, the conical end occasionally breaks off in a very small jewel hole such as a seven, eight or nine. We have a needle which we have stoned down in the lathe and then polished like a pivot to a very long, small taper which is small enough to go through a five hole. If the pegwood breaks off, we push it out with this needle.

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What brand of oil do we use? We would rather not say because some might consider it as an endorsement and at this time we are neither recommending nor endorsing anything. We will say, however, that we bought this particular bottle of oil in the fall of 1945 which makes it eight years old at the present time. We discontinued using this bottle of oil early in the summer of 1946 as we were having far too many oil failure come-backs. We should say, however, that every oil failure comeback did not show any traces of oil whatsoever. The oil had completely evaporated or disappeared. The jewels looked as clean as though they had never been oiled. Examination with a one-hundred power microscope failed to show any film. There were two reasons for our oil failures. One, we were using a ready-prepared rinse solution which we purchased in the regular manner from a material dealer. This rinse was received by us in the usual *tin can.*

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The other contributing factor was that this occurred in one of the gulf coast cities where the humidity was seldom below 80 per cent. The combination of heavy humidity and rinse shipped in tin cans caused a complete disappearance of the oil.

Some four years ago when we moved back into the central states we decided to again try this particular bottle of oil. During the past four years, using this bottle of oil with a rinse of half-and-half benzol and carbon tetrachloride, we have not had one single oil failure come-back. To us this definitely proves this particular bottle of oil to be good. We still have about half of the bottle left and although it is now eight years old (or at least since we received it) we are going to continue using it until it is all gone. We keep the bottle in the carton in which it was received, which means it is not exposed to sunlight all the time. To our way of thinking this conclusively disproves a few popular ideas.

Please pardon us, but let us digress in our thinking for a moment or two to cover some other points while they are in our mind. At the present time we have on our drawing board a chart which covers *dynamic poising*. No doubt you have read a great deal on this subject, but have you ever seen a simplified chart that shows you exactly where your errors are and how to correct them? That is exactly what this chart shows. With this chart it is possible for any workman who can read to bring even a cheap watch to not more than a *one second* error in *fourteen positions*, and do it in not to exceed two to three minutes' work. Want to know more about it? Want the chart published? Then say so.

Ever hear of poising a balance without removing it from a running watch? If you have ever seen the Lonville movie film, then you saw it there, but it was so fleeting that you may have missed it. It is very easily done, much more accurate than removing the balance from the watch and it is very, very much quicker. This could be included in some future article if you say so.

Perhaps you have several books on position adjusting. We have a chart, typewritten on an 8½x11-inch sheet of paper (standard letterhead size) which covers position, temperature and isochronal adjusting, static and dynamic poising, putting in perfect beat, effect of wrong jewels and out-of-beat causes. It covers less than two-thirds of the sheet of paper. Simplified to the "Nth degree." Just how to do it, that's all. Want to see it?

We have another photographic chart showing hairspring overcoil shapes for such popular watches as Elgin, Hamilton, Waltham, Bulova, Gruen, etc., both pocket and wrist. Want one? With it you can put a hairspring back into correct shape in a very few seconds.

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We have many other charts and instructions which are of the highest value to the workman at the bench. For example, just where to bend a hairspring to level or center it. We have not published any of these because we do not know if you would be interested or consider such things worth while. Are these worth a 2c postcard and a couple of minutes of your time to you? For ourselves, we are just an everyday working repairman at the bench who has had to work all these things out for ourselves without having anyone do it for us. We know the things that we are interested in and that bother us, but can only assume you are faced with the same problems. We can write about and give oscillograms on any of these problems if you want them.

The problem of correctly oiling watches is as old as watches themselves. A variety of vegetable, animal, mineral, marine and synthetic oils have been used in the past in lubricating all types of timepieces as well as other small precision mechanisms such as meters, etc. Blends of these natural oils with mineral oil derivatives have been used quite extensively in the past, and are used today in some cases. Probably the oil that has had the widest use in the field of horology is one which is prepared by rendering the fats from the jaw of the porpoise or sperm whale. When we first started at the watch bench practically all watch and clock oils then available were sperm oils. We understand these sperm oils are still made but practically all of them are consumed by the government for various purposes. In recent years many synthetic oils have been placed on the market. Some of these synthetic oils con-

sist of mixtures of organic chemicals which are also used as plasticizers in the lacquer and resin industries.

Some of the American watch manufacturers have spent many years in research trying to find the satisfactory oil. Whether or not this has been accomplished we leave entirely to your judgment. Exhaustive analyses of the problem show that the oil itself should not spread on either the jewel or metal surfaces to which it is applied. The oil must not become corrosive during its life in watch bearings, such as jewels, bushings, etc. A good, stable oil must not oxidize or become rancid over a period of years. Neither should it form or turn to gum under ordinary atmospheric conditions. It must maintain its chemical stability and fluidity over a period of years. It is highly essential that an oil to be used in watches, particularly present-day very small ones, should have a very low volatility within the normal range of temperatures. It should also have a very low solidification temperature.

In most watches shellac is used in the setting of the pallet stones and roller jewel, therefore a satisfactory watch oil must not attack or soften this natural resin. A satisfactory watch oil must have good boundary lubricating properties, particularly due to the bearing pressure of an average-size balance.

According to the currently accepted ideas of the theory of lubrication as applied to watches, lubrication is divided into two types: viscous lubrication and boundary lubrication.

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If the moving and stationary surfaces of a bearing at their point of nearest approach or contact are still separated by a distance equal to several thousands of times greater than the molecular dimensions, viscous lubrication is the result. This condition exists in the presence of relatively high speeds and low bearing pressures. The frictional forces developed under these circumstances are a function only of the viscosity of the lubricant used. Reynolds first formulated the laws governing viscous lubrication.

Boundary lubrication results when the bearing surfaces are separated by a layer of lubricant only one or a few molecules

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in thickness. This condition is present when the speeds are low or the motion is intermittent; and the bearing pressures relatively high. In this type of lubrication the frictional forces are practically independent of the viscosity of the lubricant and are a function of its chemical structure and the nature of the bearing surfaces.

Spreading is a quality that is highly undesirable in a good watch oil. The greater the contact angle of an oil, the less its spreading quality. Corrosion is a quality which cannot be tolerated in a watch oil, as corrosion will attack highly polished surfaces such as the pivots of the balance staff, pallet arbor, escape wheel, etc., causing highly erratic rates. If the corrosion is too great the polished surfaces of the pivot are completely destroyed with the resultant stopping of the watch.

If you are fortunate enough to possess one of the old, original Elgin Service Bulletins, you will find an excellent explanation of watch oils running through from page 13 to page 18. This article does not appear in the present editions of these Bulletins. We are deeply indebted to the Elgin National Watch Company's Service Bulletins for many of the ideas expressed in this article.

One of the oil companies makes the following claims for its watch oils: If a drop of their oil is placed on a piece of brass or other metal, it will not oxidize the metal or even change the metal's color. They state that fourteen years ago a drop of their oil was put on a piece of brass and that the brass still looks exactly the same today as it did at that time.

They further claim that their oil is always liquid; that it will not freeze even at a temperature of —80° F.; that when put in a refriegartor with nitrate of ammonia, the oil will not freeze. Most other watch oils when subjected to the same treatment either freeze or separate into two parts.

That it does not evaporate even at a temperature as high as 180° F. That their oil when treated with any form of potash will not turn to soap. Most watch oils treated with alkalis become soap.

That their oil when treated with any acid or reagent, even nitric acid, will remain indifferent to all chemical composition and will not make any acid product.

That their oil when treated with alcohol remains the same after the alcohol has evaporated, leaving no sediment. Most all other oils will not stand this test.

Truly if this oil will do all of these things, then the manufacturer has a very superior product. We have not tried this oil personally so cannot vouch for all of their statements. However, we do expect to give this oil a thorough practical test and will report the results later.

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The viscosity of an oil is rated or expressed in a unit called centistokes. The lower the figure, the lighter the oil and, conversely, the higher the figure, the heavier the oil. One oil manufacturer markets his product in eight different viscosities, the lowest being 31 and 36 centistokes, respectively. Such light oils are not satisfactory for general use in watches. They should be used with caution even in 2½ and 3 ligne watches. A viscosity of 45 centistokes is recommended for the balances of very small watches, and 55 centistokes being usable on the balance of any size watch. For the train of very small watches, 61 centistokes and for the train of any size watch, 86 centistokes. Pallet stones usually require a light viscosity of about 41 centistokes. A very heavy oil of 207 centistokes hardly finds use in watch work. They also have a very heavy oil which is used for watch mainsprings, inside the barrel, and may be used on any size watch for this purpose. They also make a greaseless grease much resembling vaseline, which does not spread as it has excellent properties of staying where you put it. This is particularly useful on stems and the steel winding and setting parts in watches which are subjected to heavy moisture or perspiration. By applying a liberal coating to the stem and its bearing in the plates you will experience much less trouble with watches coming back with stems that have been eaten in two by rust.

High viscosity tends to retard mechanisms, but in view of lubrication safety, it is suggested that in any case you use the highest viscosity oil compatible with the satisfactory operation of the part being oiled. Oil forms a film on the surface of

the oiled part, the strength of which increases with the degree of viscosity. It is of the utmost importance and absolutely necessary that the parts to be lubricated be very carefully and thoroughly cleaned before lubrication. A poorly cleaned surface tends to facilitate the rapid decomposition of the lubricant. This manufacturer recommends the use of pure benzene or trichlorethylene as a rinse solution. We have found either of these to be entirely satisfactory, but benzene must be handled with care due to the fire hazard. Do not let your fire insurance agent know that you keep benzene, acetone, ether, chloroform or other volatile, highly flammable chemicals on your premises or your fire insurance rate will go sky high.

Oil failure in watches is of such great importance that we have thought it proper to give some additional information this month that was not in our preceding article. Many watch repairmen have tried everything they could think of. Many others have been on the right clue believing that there was something in their cleaning process that was killing the oil. Many have reasoned it out that it possibly could not be the oil because not all watches oiled from the same bottle of oil suffered oil failure. They were unable to determine exactly why the oil stood up in some watches and failed in others which were oiled in the same manner with the same oil. It proved to be quite a perplexing problem with only a very small percentage knowing the answer. We do not say that solutions shipped in tin cans are the cause of *all* oil failures, but we do say that this is by far the major cause of oil failure. Other things which will cause oil failure are high humidity of the work room, careless cleaning of the jewel holes and surfaces, improper oiling, wrong oil, excessive heat such as placing watches in a show window where they come in contact with the direct rays of the sun, and a few other things. But all of these things put together do not account for possibly a total of 5 per cent of the oil failures. Your good old friend the tin can, we believe to be the cause of more than 90 per cent of the oil failures.

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can expect some oil failure come-backs. If you work in a shop that is air conditioned, a dehumidifier can be very easily added to the air conditioning unit at a very reasonable cost.

We know that a few thousand watch repairmen are making and using their own cleaning and rinse solutions. Many have found that by so doing their oil failure come-backs have been reduced to almost zero. By making their own solutions and storing them in clean glass jugs, their solutions are not being contaminated by either an inhibitor or soldering flux. Your solutions should be kept in clean glass jugs and in a cool, dark, dry place. Be sure the caps are well screwed down so that moist air cannot get into the jug. Buy your chemicals from a wholesale chemical company. Most any one of them will sell direct to you at their regular wholesale prices provided you make your purchases in their standard container lots. In other words, some chemicals are sold only in gallon jugs, while others may be sold only in five- or ten-gallon drums. Ask them for their prices in their standard containers. Such wholesale houses are listed in the yellow pages of the telephone directory of most any city of moderate to large size. We buy some of our chemicals in one-gallon lots and others in five- or ten-gallon lots. Always specify that you wish the very best grade of each item. Ask for C. P. (chemically pure) if they have it, but if not, then get the next best grade which is usually known as technical. You will be surprised at how cheaply you can make up your own solutions. Including the freight charges, our watch cleaning solution is costing us less than 25c per gallon and our rinse solution slightly less than $1.00 per gallon. Not only do we make a substantial saving in the cost of these solutions, but we know we are getting the best grade chemicals without any contamination in the chemicals themselves, in the process of compounding or in the containers in which they are stored.

Some watch repairmen do not like to use a foam type cleaning solution. Perhaps their dislike is based on the formation of too much heavy lather on the top of the solution when cleaning a watch. If you get more than one-half an inch of foam on your solution, you are running your motor too fast. Slow down the speed of your motor, then the watch basket will not cut through the solution as fast as it did, therefore it will whip less air into the solution. Another thing, if the speed of your motor is too great, you run the risk of breaking small pallet arbor pivots and other long pivots, such as the pinion on a sweep wheel. This is particularly true if you reverse your basket, either manually or automatically. Foam type solutions all contain some form of soap, whether it is oleic acid, tincture of green soap, Ivory or Swan soap flakes, castile, etc. Naturally the soap in your cleaning solution is going to form a lather if it gets the opportunity. We believe the detergent action of soaps in the cleaning solution brings out a much brighter finish on the metal and therefore recommend their use.

Here are the formulae for two entirely satisfactory foaming watch or clock cleaning solutions:

2 ounces Oleic acid, preferably C.P.
4 ounces Acetone (be sure the bottle label says "Dimethyl ketone").

Mix well, pouring the acetone a little at a time into the oleic acid and shake well each time to insure proper mixing. Do not pour the oleic acid into the acetone. If time is available, allow to stand for three or four hours, then add 8 ounces 28° ammonia, pouring in a little at a time as before and shaking vigorously each time. Release the cap on the jug and allow the gas to leak off slowly each time. Do not completely unscrew the cap, but just enough to allow the gas to leak off rather slowly. Again if time is available, allow to stand for three or four hours and then add 8 ounces 3% solution Hydrogen Peroxide.

This may be added all at one time, pouring in slowly. Shake well and let settle, then let it stand for three or four hours, then add enough distilled water to make a gallon of finished solution. (Tap water may be used if it contains no harmful minerals or chemicals.)

When finished the solution should have a very faint milky or yellow color depending upon the age and purity of the oleic acid used. Use the solution full strength in your watch cleaning machine jar.

This solution is also an excellent jewelry cleaner for removing rouge, etc., from polishing. If you wish to use the solution for this purpose, do not add enough distilled water to make one gallon of finished solution, but only enough distilled water to

make one-half gallon of finished solution. If this is done, you would mix this concentrated solution with an equal quantity of water when used in the watch cleaning machine. For cleaning jewelry and the like, use the concentrated solution full strength. The warmer the solution, the faster it works, but do not boil. If you are troubled with removing the green corrosion from wrist watch cases, you will find this concentrated solution will do a better job, faster and easier than anything you have ever used. When you first start to clean your watch, remove the crystal (absolutely necessary if the crystal is any type of plastic or unbreakable) and the band, if leather. Place the case to soak in the concentrated solution while you are cleaning your watch.

When you have finished cleaning the watch, take a wash-out brush and thoroughly scrub the case inside and out. The hard, green corrosion will disappear almost as if by magic. Try it. The only band you need remove is one made of leather. Cord bands on ladies' watches may be put in the solution without harm. If you have polished the case on your polishing motor and there is rouge in the cord, scrub the cord the same as you do the case and the rouge is all taken out. If the case is waterproof and has a plastic gasket, remove the gasket as the solution will either dissolve or swell the plastic gasket until it cannot be reused. The same applies to a waterproof crown with a plastic gasket inside. Do not remove any type of metallic gasket such as lead, etc. The concentrated solution is an excellent cleaner for diamond rings, particularly a lady's ring that is all clogged up with "pie dough" (know what we mean?). Just a little vigorous scrubbing cleans the ring like new.

● ● ●

After cleaning cases, jewelry, rings, etc., with the concentrated solution, rinse them good in running water. Remove all surplus water and put into a cup of alcohol allowing it to remain at least a minute, when the work can be taken out and quickly dried with your blower, or in hot sawdust.

If you once use the concentrated solution for ring and jewelry cleaning, we believe you will use it from then on. By making up the solution in the concentrated form,

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you need make only one solution, because you will dilute the concentrated solution with an equal quantity of water to use it in your watch cleaning machine.

Another good foaming solution is:

Tincture of green soap	2 ounces
Oleic acid, U. S. P.	2 ounces
Acetone (methyl ketone)	2 ounces
28° stronger ammonia	20 ounces
Distilled water to make one gallon.	

This solution is made up in much the same manner as the former one. Mix the tincture of green soap and the oleic acid first, then add the acetone. After this is all thoroughly mixed, add the ammonia. When this is well mixed, add the water. This, too, can be made up in a concentrated solution by using half the quantity of water. When made up as a concentrated solution, you add an equal part of water to the solution when using it in your watch cleaning machine, but use it full strength for all jewelry and metal cleaning by hand with a wash-out brush.

We have this formula in the original handwriting of Mr. Daniels and he assured us this to be the correct formula for his "New Life" watch cleaning solution.

In every day use we find very little or no difference in the results obtained by either of these solutions.

For a rinse solution there are many chemicals that can be used with excellent results. Some watch repairmen still prefer to use old time white gasoline. However you may experience considerable difficulty in obtaining in your community a white gasoline that you will find satisfactory. We do not recommend its use, particularly since nearly all white gasolines contain liberal quantities of paraffin, thereby leaving a heavy coating of this wax on your watch and its parts.

Whatever you use as a rinse solution must be one that will not affect the shellac used in setting the pallet stones and roller jewel. For that reason we do not particularly recommend the use of ether, either individually or in conjunction with other cleaning agents or solvents.

Carbon disulfide may be used individually or in mixture with other solvents. We prefer to use a mixture of half benzol and half carbon tetrachloride, or straight trichlorethylene without mixture with any other chemical. Some of the European watch oil manufacturers highly recommend the use of trichlorethylene as a rinse. Many prefer to use it as it is absolutely nonflammable, therefore there is no danger of a fire from a spark from your watch cleaning machine motor. Petroleum benzin is a very good rinse, but is objectionable from the fire hazard standpoint. Ligroin is merely a refined solvent naphtha which is stronger or has a greater solvent power than petroleum benzin.

We recommend that you try whichever of the cleaning and rinse solutions that you desire. The most important thing is to avoid contamination. *Do not store any of these cleaning or rinse solutions in tin cans, use only glass jugs.* Make sure the jugs are clean and thoroughly dry before using them for your solutions. There are far too many chemicals and other foreign substances which will kill your oil no matter what brand or type you use. You can not exercise too much care in the making and storing of your solutions and likewise the care of the glass jars of your watch cleaning machine.

(Next month: Chemicals Used in Watch Cleaning Solutions.)

There's nothing more irritating for a customer in a jewelry store than to ask a clerk the price of an article—and discover that the clerk doesn't know.

* * *

Isn't it true that the jewelers who have the messiest looking backrooms—are the same jewelers who will scream the loudest if their wives leave dirty dishes in the sink.

"Blackie, you're so funny! Every time I ask you how much you paid for my jewelry you say, 'Oh, it was just a steal.'"

A One-Minute Business Sermon

by Dan Valentine

There's an art to selecting personnel for your jewelry store—and it's an art that must be acquired if your establishment is to find success.

The day of hit-or-miss hiring of workers is past; nowadays, workers in retail establishments—including jewelry stores—must be on the ball.

After all, your employes are on the front lines in the battle for business.

You can have the most modern jewelry store in town; carry the finest merchandise, give the best service—and this can be nullified with one surly, cranky, discourteous salesman.

So be careful when you hire a new employe.

It's paradoxical that a good jeweler will keep an eagle eye open to see that nothing but the best quality merchandise leaves his store—and then turns around and hires inefficient help.

Here's a capsule checklist for the qualities to look for in an employe:

Neatness: A neat person usually has a neat mind, and a neat mind indicates a well-groomed personality.

Honesty: Not only honesty when it comes to money, but intellectual and moral honesty. It's far better to have an employe who is honest deep within himself than a worker who is honest only on the surface.

Ambition: An ambitious worker (if not too much so) always puts more energy and fire in his job than an employe who is just passing the time away.

Tact: This is becoming a lost art. A tactless person can do more harm in one day in a jewelry store than ten full-page newspaper ads can remedy.

Knowledge: Shy away from the person who doesn't take the time to learn what he or she is talking about. One glib salesperson can do more harm in a jewelry store than ten employes who do not open their mouths.

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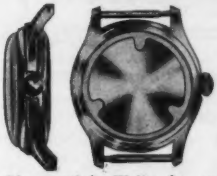

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Jewelry Repairing

By R. ALLEN HARDY

Tools and Equipment

I HAVE observed from time to time many jewelry repair benches very poorly equipped to handle even the simplest type of repairing and I have wondered just why this condition exists. It must be either because of inadequate knowledge or a failure to attach sufficient importance to the selection and proper care of the equipment necessary to do satisfactory jewelry repair work.

As in watchmaking, the condition of equipment and tools is relative to the type of work turned out by the repairer. If tools and equipment are adequate, the jobs turned out with them will be better than those turned out with poor tools and makeshift devices. Good work means few comebacks, satisfied customers, and a great saving in time which represents profit.

For simple jewelry repairing, the following tools are suggested as being the basic ones needed:

Files

No. 2 6" Barette file, No. 2 6" half-round file, No. 4 6" half-round file, No. 2 6" flat file.

Buffs

Two combination inside felt ring buffs (one for tripoli, one for rouge), one assortment emery cones with wood taper, two 5" flannel buffs, one 5" muslin buff, one assortment of all grits of emery sticks, two 3" bristle brushes.

Jewelers saw frame and blades, one half-round pliers for ring shaping, two pair snipe nose pliers, one pair bow pliers, contracting; one bench vise, one charcoal or asbestos pad, one blowpipe, one soldering tweezers, one tweezers for general work, one pair cutting shears, one pair side cutting pliers, one small pinvise, one medium pinvise, one large pinvise, one ring clamp, one mandrel, steel, grooved; one ring mandrel for sizing, one set ring sizes, stick rouge, brick tripoli, bench pin.

While this list appears to be quite lengthy, it only represents the minimum requirements, tools that must be on hand to take care of the average run of jobs that the customer expects to be repaired on the premises. This list may be supplemented by many more tools of a more specialized nature. Actually, there are many special devices that may be made or purchased, intended to aid the repairer to do one specific job better or quicker. It is advisable for the beginner not to consider the specialized tools until he is thoroughly adept at using the basic tools.

While some of the files mentioned here are standard equipment for the watchmaker's bench, the half-round file deserves some discussion. Its purpose is primarily to shape the inside of a ring after sizing. The No. 2-cut roughs out the job and the No. 4-cut smooths the surface preparatory to buffing with tripoli and rouge. The technique in using this file will be discussed later under "Ring Sizing."

The No. 2 barrette file is used for outside ring filing and for filing the flat sides.

The No. 2 6" flat file is for general work, roughing out and shaping. A No. 4 6" file is useful although the barrette No. 4 or the half-round No. 4 may be used instead.

The combination inside ring buff is quite a timesaving device. Its taper is perfect for smoothing out the inside of the ring; the flat surface of the wheel section is ideal for the outside surface; and the sides of the wheel present an excellent plane to polish out the file marks on the sides of the shank.

The assortment of emery cones with

Mr. Hardy invites your questions pertaining to jewelry repairing. Questions should be directed to Mr. Hardy, c/o The American Horologist & Jeweler, Box 7127, Capitol Hill Station, Denver 6, Colorado. Please enclose a self-addressed, stamped envelope.

wood taper is used to great advantage for inside ring work. The assortment ranges from grit 3 to 4/0 emery. File marks are quickly removed. While the tripoli inside ring buff will do the same job, it is well to have the emery cones on hand, also.

The 5" flannel buffs are for general work. One may be used with tripoli, the other with rouge; and here is a good place to mention the exact purpose of tripoli and rouge. Tripoli is a cutting agent primarily and rouge is a polishing agent. It is best to always be conscious of the cutting characteristics of tripoli to avoid over-use of the tripoli buffs. It is an easy thing to remove too much metal by pressing too hard against the tripoli buff or by using the buff for too long a period of time. Rouge is used primarily to obtain a high luster or "polish," and although it will remove metal if overused, it does not need such close watching as does tripoli, for the luster usually appears long before any damage is done to the surface.

The 5" muslin buff should be reserved to restore a high luster on silver surfaces. The muslin buff is a finer cloth and is preferable to the flannel because there is less risk of knots appearing on the buff that might mar the soft surface of fine silver. Once a line or groove is cut into a silver surface it is quite a difficult thing to restore a mirror finish without blemish.

The assortment of emery sticks (all grits) are handy to have for a number of miscellaneous jobs that will turn up during a busy day. Line finishes may be restored on small objects, nicks may be removed, some filing operation may be done by using the coarse grits, marred surfaces may be restored to mirror finishes by first using emery sticks and finishing up on the polishing lathe. This represents only a few of the many uses of the emery stick.

The 3" bristle brushes may be used on articles that have corners and crevices that cannot be reached by the average flat buff. They are good for buffing in and around ring mountings, etc. It is desirable to have one for tripoli and one for rouge.

The jeweler's saw-frame may be purchased in a variety of depths. For average work, however, a 2" to 3" depth is adequate. Blades, of course, may be purchased

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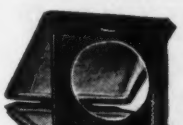

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in many thicknesses, ranging from coarse to very fine. An assortment of different widths is helpful but not necessary. A good medium sawblade, one that is neither too coarse nor too fine (about size 1/0) will do very well for most work. One too thick will remove too much gold when sizing rings (this can throw you off as much as ½ size); one too thin will not have the durability expected, and breakage will be high.

Half-round pliers are used specifically for ring sizing. One jaw is flat, the other half-round, as the name implies. While the bow contracting pliers are most helpful in shaping rings for sizing, there is no real substitute for the half-round pliers. There is a need for both.

Snipe nose pliers have so many uses it would hardly be possible to list them. The need for two pair exactly alike is to take care of specific jobs that crop up frequently—like handling jump rings. To open a jump ring requires two pair of pliers. To close a jump ring tightly requires the use of two pair of pliers.

The bow pliers (contracting) are primarily used for closing bows on watches. They are especially useful for many other contracting operations, mainly closing rings, preparatory to sizing. They will bring the joint together quickly and snugly.

The bench vise is a third hand, so to speak. It enables one to hold the article firmly in its jaws, and to use both hands to administer whatever operation is needed.

The charcoal or asbestos pad is used in conjunction with flame soldering. The article to be soldered is placed in position (usually pinned in position) while the flame is applied to the area to be soldered.

The blowpipe is used for flame soldering. Air is inhaled through the nostrils and exhaled through the metal tube. Through practice a continuous flame can be successfully managed by maintaining a steady pressure or blast of air through the tube.

Soldering tweezers are used for holding articles to be soldered. The most handy type comes equipped with a slide-lock that holds the article clamped in the same position until the soldering operation is completed. There are several different designs of soldering tweezers and since they are usually very inexpensive it is helpful to have 2 or 3 different styles. One may be more desirable for a certain job, while another will serve better for a different job.

Tweezers for general use such as holding and picking up small articles like jump rings, small pieces of solder, etc., may be selected to suit the fancy. Sturdy points not too blunt nor too fine usually are most desirable.

Many jewelers and watchmakers use various methods for breaking off or cutting small sections of solder but to my knowledge none do the job quite as well or as neatly as cutting shears. These can be bought especially designed for the jeweler's needs and can be used for many purposes. They will cut solder very precisely so that the exact size wanted can be used each time a joint is made. Good cutting shears are a good investment and need be bought only once.

Side cutting pliers are a must for the jeweler's bench, particularly for cutting wire, pinstems or for shortening any small piece of metal. For durability it is best to select the finest steel side cutters available.

Pinvises are always handy to the jeweler and it is good to have an assortment ranging from small to large.

A ring clamp is naturally essential for any type of stone setting or tightening job although this tool can be used for multiple clamping jobs. For steadying the clamp, while working on a mounting, a groove or notch should be cut on both sides about one inch below the tip of the rounded end. This groove can be braced against the edges of the bench pin while considerable pressure is being exerted on the mounting from the top. This eliminates the danger of the clamp slipping or shifting position in any way that might ruin the job being done.

The ring mandrel used for sizing jobs should be made of good steel with standard size graduations. If the beginner wonders whether he should purchase a grooved or ungrooved mandrel, the obvious answer (if only one is purchased) is to select the grooved one. This will take care of both stone set rings and wedding bands while the ungrooved mandrel will not handle all stone set rings. It is much

handier to have both types of mandrels on hand, for one must be especially careful (while using a grooved mandrel) not to leave a marred surface on the inside of a wedding band. The sharp edge of the groove is to be watched very carefully, and if by accident a stroke of the mallet (while pounding) hits the ring over the groove, a time-consuming operation is necessary to remedy the damage done.

The ring mandrel used for determining the actual size of a ring is usually constructed of a chrome-plated base metal with a wooden handle. This ring mandrel or "stick," as it is sometimes called, serves a double purpose in a jewelry store. It is needed "out front" by the salespeople for selecting the correct size for a customer, and it is used in the shop for checking sizing jobs. There is still another most important feature about this mandrel. It has the size graduations (used in making rings smaller or larger) marked on the side of it near the tip. I have often wondered why this scale was not put on the hard steel mandrel, also, since this is the one most used by the jeweler, but I have never run across one that had it.

A set of round ring sizes is, of course, necessary to determine exactly what size ring the customer should have. Each ring is marked with its respective size.

There are many compounds available for restoring the luster and finish to jewelry. The beginner need only acquaint himself with two—rouge and tripoli. Tripoli is a cutting agent, rouge a polishing agent. Tripoli removes file marks—rouge restores the brilliance or high luster.

* * *

The bench pin is an attachment worthy of more attention than is ordinarily given it by the average watchmaker-jeweler. It has many possibilities and advantages. To the full-time jeweler, it is indispensable. Since it protrudes from the edge of the bench it is in an excellent position for hand filing and for filing from all angles. In this position the gold filings are allowed to fall into the top drawer and are saved. Bench pins are usually altered from their original shape to suit the whims and uses of the individual jeweler, but the most widely used alteration is to saw out a "V"-shaped wedge from the tip of the bench pin. This forms a perfect slot in which to

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place the ring clamp, allowing it to be braced solidly from two sides. In addition to this, most jewelers have 2 or 3 grooves shaped on the top surface of the bench pin, to accommodate various size pins for "roll-filing."

The polishing lathe, the soldering machine or torch outfit, and the jeweler's bench are the three major equipment items. The polishing lathe should be considered carefully. The ideal type for the repair shop is one that has two speeds, two spindles and a dust collector. There are available, however, many smaller models that will do an adequate job for both small and large shops. Compact table model outfits may be purchased with or without the dust collector.

In purchasing a soldering machine the important feature to consider is the heat adjustment. Be sure the heat may be adjusted very low (to take care of soft soldering jobs) and also that it may be adjusted very high to take care of platinum soldering. Usually the adjustments are very simply made by using a rheostat.

A torch outfit should have several nozzles so that the desired flame may be easily regulated. If natural gas is available, a gas-oxygen outfit is very desirable. If no natural gas is available, an acetylene outfit will do a satisfactory job.

The design of the jeweler's bench is very important to the jewelry repairer who is earning his living at that alone. The bench pin must be located in a certain spot (usually in the center), the bench vise must be placed exactly right, the lap drawer must be located at exactly the right height for maximum efficiency. In fact every conceivable tool or piece of equipment (except the polishing lathe) should be at the jeweler's finger tips or at least within easy reach. Benches may be purchased from the same houses that offer watchmakers' benches.

Many watchmakers and engravers who wish to learn jewelry repairing may not wish to invest in a jeweler's bench since they do not expect to apply that much time to jewelry repairing. Even so, it is better to do that type of work at a separate table or bench. The level of the top of the bench should be lower than the watchmaker's bench. There should be a lap drawer (which is very easily made) and there should be a location for a bench pin. Since most of the hand tools are kept in the lap drawer and 90 per cent of filing is done on the bench pin, it would hardly be logical to improvise rather than use these two features.

Lap drawers for the jeweler should be sturdily built. They should slide in and out very easily. It is best to line the inside of the drawer with tin, curving the rear corners so that gold dust and filings may be easily removed when emptying the drawer.

Coming Conventions, 1954

February 14, 15, 16—Pacific-Northwest Jewelers Convention, Multnomah Hotel, Portland, Oregon.

March 20, 21, 22—Nebraska Retail Jewelers Association Annual Convention, Grand Island, Nebraska.

March 21, 22—Indiana Retail Jewelers Association Annual Convention, Lincoln Hotel, Indianapolis, Indiana.

March 28, 29—Oklahoma Retail Jewelers Association Annual Convention, Skirvin Hotel, Oklahoma City, Oklahoma.

April 3, 4, 5—Kansas Retail Jewelers Association Annual Convention and Gift Show, Lassen Hotel, Wichita, Kansas.

April 25, 26—The Pennsylvania Retail Jewelers Association Annual Convention, Brunswick Hotel, Lancaster, Pennsylvania.

May 2, 3—Maryland-Delaware-District of Columbia Retail Jewelers Association Annual Convention, Hotel Dupont, Wilmington, Delaware.

May 2, 3, 4—California Retail Jewelers Association Annual Convention, Ambassador Hotel, Los Angeles, California.

May 2, 3, 4—Florida Retail Jewelers Association Annual Convention, Miami, Florida.

May 2, 3, 4—New York State Retail Jewelers Association Annual Convention, Elmira, New York.

Married in New York City on Friday, January 15, 1954, were Robert Kaempfer of the Watchmakers of Switzerland Information Center, New York City, and Miss Micheline Lise Jean-Mairet, daughter of Mr. Fernand Jean-Mairet of Lausanne, Switzerland.

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A One-Minute Business Sermon

—by Dan Valentine—

There's only one thing harder in the jewelry business than getting a new customer—and that's keeping him once you've got him!

It's a sad fact but true that a lot of jewelers are so busy trying to entice new customers into their store that they forget all about the all-important business of keeping the old ones.

Just like everything else, there are certain little tricks that can be used to keep a customer coming back once he has traded at your retail jewelry store.

Here are a few of the tricks:

1. Know your customer's name. Folks get a kick—and a sense of importance—if a clerk can call him by name. And a customer will always return to a jewelry store where he is called by name.

2. Prompt service. Customers are impatient. They like to be waited on. You'll find that a customer likes to return to a store where he or she can get quick, alert service.

3. Open displays. Customers just naturally like to look at merchandise. Does your store feature displays that give customers a chance to see the merchandise? If you have such displays, never fear, your customers will return.

4. Parking. Probably one of the greatest points to make a customer return these days. A customer likes to patronize a jewelry store that offers parking facilities.

5. Store hours. Customers want to shop when *they* want to shop, not when *you* want them to shop. Are your store hours arranged for the convenience of the greatest number of your customers? If they are, your old patrons will return time and time again. There is nothing more that can stop a regular customer from coming than a "closed" sign on the front door of a jewelry store.

These are just a few of the tricks to make your customers return. Use these tricks—and you'll have no trouble making a regular customer out of the patron who comes in your store the first time!

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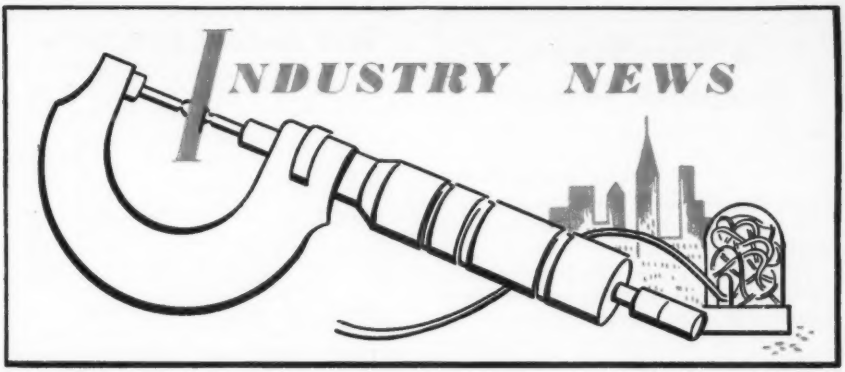


VAUCHER BEGINS 21st YEAR AS SWISS WATCH ASSN. HEAD

Horological circles throughout Switzerland recently honored Maurice Vaucher, of Bienne, on the occasion of his 20th anniversary as president of the Federation of Swiss Watch Manufacturers, the trade organization also known as The Watchmakers of Switzerland, which represents all the country's manufacturers of jeweled-lever movements.

It was recalled in Bienne that Vaucher was elected to the presidency of the organization during the period when world-wide depression had drastically affected the watch market, throwing thousands of trained watch craftsmen out of work or forcing new kinds of employment.

Some manufacturers, in a desperate effort to make sales even at the cost of undermining traditional standards of Swiss watchmaking, sacrificed quality and workmanship in order to cut prices. The task set for the Federation was one of rehabilitation of Switzerland's major export industry.

Under Vaucher's direction, one of the first tasks was to impress upon elements of the watch industry the great need for mutual and concerted action. It became apparent that Swiss watchmaking could flourish again only if Swiss manufacturers themselves worked together to insure that, regardless of market conditions, workmanship would never fall below the high standards which had already won world leadership for Swiss timepieces.

It was Vaucher who organized the Federation's Marketing Department to deal with marketing developments and sales of quality Swiss watches the world over. Today, the department conducts an advertising and merchandising campaign in 20 countries. The Federation also aided in the standardization and cataloguing of replacement parts for jeweled-lever watches and movements, making it possible for jewelers and watchmakers to render prompt and efficient repair service.

In the beginning of his 21st year as president of the Federation, Vaucher expressed confidence in the future of Swiss watchmaking and predicted steady progress by the industry comparable to that made since the dark days of 1933.

LAMPERT COMPANY MARKETS ELSON TOOL & CLOCK STAND

M. J. Lampert & Sons, Inc., 352 Fourth Avenue, New York City, announces that the Elson Clock Stand No. 1934 is now available through material dealers.

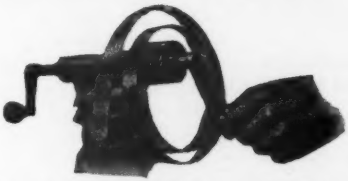
The Elson Clock Stand is designed to hold any regular clock movement, and is priced as $5.95. Adjustable arms and adjusting screws in the base make regulating simple, and the heavy base prevents tipping.

The Lampert firm is also exclusive wholesale distributor of the new Elson Carbide Graver, which features a carbide steel bit permanently mounted in an easily

gripped handle for fine cutting and turning operations. The company points out that watchmakers, engravers and mechanics will save sharpening time, since the tip needs only occasional grinding, and that the Elson bit is from 20 to 200 times harder than high speed steel, thus allowing easy cutting of the hardest steels.

The Elson Carbide Graver No. 765 is available at tool and supply houses at $1.75 each.

BERGEON CLOCK MAINSPRING WINDER IS NOW AVAILABLE



Important information to all clock repairmen is the availability of the Bergeon Clock Mainspring Winder. This winder consists of a sturdily constructed cast lacquered frame which can be fitted into a bench vise for operation.

There are two crank handles and 8 arbors with 8 slotted tubes measuring 18, 25, 30, 35, 40, 48, 57 and 65 mm fitted into a strong wooden case. This specially constructed winder permits the strongest mainspring of a clock, time recorder or gramaphone motor to be wound and fitted to the barrel without effort. It also winds the smallest springs of alarm clocks.

Operation of the winder, after placing it in a vise, consists of positioning the crank handle with screw spindle to the left, choosing the tube which fits into the barrel, hooking the curved part inside the spring onto the hook of the arbor, sliding the spring into the notch of the tube, adjusting the moveable crank to the right, and winding the spring. When this is done, the crank and arbor are taken away, the tube placed into the barrel, turning the crank handle to the left to

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push the spring into the barrel.

The mainspring winding operation can be interrupted at any time without the mainspring loosening, since it is held tightly in place by the wall of the tube.

Bergeon Clock Mainspring Winder is distributed in this country exclusively by B. Jadow, Inc., through wholesalers only. When ordering, refer to No. 30076, which costs $74.80.

INCABLOC FORMS NEW CORPORATION IN U.S.

Universal Escapement, Ltd., of La Chaux-de-Fonds, Switzerland, manufacturers of shock absorbers for watches, has announced the opening of the new Incabloc headquarters in the United States. The new company, known as the Incabloc Corporation, has its offices at 15 West 46th St., New York City.

Directing the activities of the new firm in the United States are Julius S. Impellizzeri, president, and William G. Wenzel, vice president and director of sales and advertising.

Impellizzeri, who has held several government and private advisory and administrative posts, is an attorney and will also serve as general counsel of the new company. Wenzel was formerly director of sales and advertising in the U. S. for the Universal Escapement, Ltd.

Helping to inaugurate Incabloc's new offices. Left to right: Peter M. Fahrendorf, president, Jewelers' Circular-Keystone; Sam Mintz, publisher, Jewelers' Outlook; Julius Impellizzeri, president, Incabloc Corp.; Lansford F. King, editor, Jewelers' Circular-Keystone; Bernard Robinson, vice-president, Finlay Strauss; William Wenzel, vice-president, Incabloc Corp.; Kurt Schwab, president, Rodania Watch Co. of U. S. and Canada; and Phillippe Braunschweig, son of Georges Braunschweig, president of Universal Escapement, Ltd., and founder of Incabloc.

HAIRSPRING VIBRATING CO. OFFERS TWO NEW TOOLS

A sturdy Hand Potence Press is being made available by the Hairspring Vibrating Company of Union City, N. J.

The new tool is designed to be used for press fitting small parts and has slides which may be adapted for magazine feed. Manufactured without a micrometric stop, the press costs $45.00.

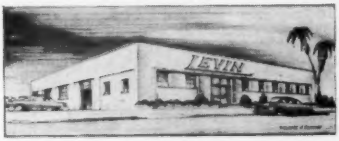
Also available, at $96.00, is Hairspring Vibrating Company's Staking Potence, featuring a fine micrometric adjustment. This press can be used by hand or foot pedal for fast assembly of many instruments, watch, and clock parts. The center pin is spring loaded for ejecting; the potence also comes with a solid plate with a small center hole.

Orders and requests for further information on these potence presses may be sent to Hairspring Vibrating Company, 406 32nd Street, Union City, N. J.

NEW PLANT FOR MINIATURE PRECISION LATHES & TOOLS

Louis Levin & Son, Inc., Los Angeles manufacturers of jewelers' type lathes, micro-drill presses and precision tools designed for watchmakers, has announced the completion of a new building located at 3610 South Broadway, Los Angeles 7, California.

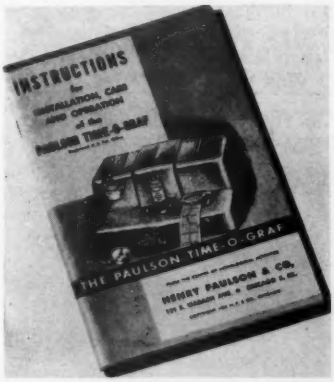
The newly completed construction contains 7,500 square feet of housing space for additional shop work and inventory storage, with a complete display room where Levin tools can be demonstrated.



The firm disclosed that the modest little shop which once intended to make precision tools for watchmakers only has, since the start of World War II, found it necessary to expand in order to supply large quantities of precision equipment with the addition of facilities for micro-machining.

The Levin firm, in addition to supplying the trade with jewelers' and watchmakers' instruments, has been contributing toward supplying the demand for micro-machining techniques and the manufacture and maintenance of new instruments for measurement and control.

PAULSON FIRM RELEASES LATEST TIME-O-GRAF BOOK



Henry Paulson & Company, of Chicago, currently releasing free-of-charge copies of the new instruction book for the Paulson Time-O-Graf, continuous tape and error detecting device designed for watchmakers and repairers.

The latest information relative to the machine is available by writing to Henry Paulson & Company, 131 S. Wabash Ave., Chicago 3, Ill.

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BALANCE STAFF
Swiss or American Staffs—All models in stock; individual packages of 3—Now only $1.50 dozen or $15.00 gross.
Finest Quality at Lowest Prices
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20 Watch Movements sent for 1 lb. of any G. F. Scrap you send us.
5 American Pocket Watches..... $22.00
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Above need minor repairs. Write for price list.
B. LOWE, Holland Bldg., St. Louis 1, Mo.

The Paulson Company also offers a two-week, no-risk, no-obligation trial of its Time-O-Graf to members of the trade who do not own a machine. Requests for information should be addressed to Roy While in care of the company.

NEW J-B DISPLAY FEATURES 'GOLDEN COIN' BAND SERIES

Wholesalers throughout the U. S. and Canada are now showing a new display that features four J-B Watch Bands created especially for round watches. Since the bands are designed to give the impression of a series of gold coins, overlaying each other, this group has been named, "Golden Coin" Watch Bands.

Each band has a special type endpiece that makes it desirable for use on round watches.

The "Golden Penny" model shown above is yellow gold filled and retails at $8.50. The three men's bands are also yellow gold filled, retailing at $9.50, $9.95, and $10.95, respectively, FTI.

The entire unit costs the jeweler $15.75 and the 4 bands, when sold, bring him a total of $38.90.

SOBEL BROTHERS INSTALL CHRONOGRAPH PARTS LINE

Installation of a complete line of genuine Chronograph Repair Parts has been announced by Sobel Brothers, 318 Ninth St., Washington, D. C.

In announcing the availability of this material to the trade, Eugene Sobel, head of the firm, pointed out that the company's watchmaker customers will now be able to get immediate delivery of chronograph parts needed for their daily watch repair work.

ELECTROGLAS CRYSTALS NOW INCLUDE FLAT-TOP STYLE

Electro-Seal Watch Crystal Company of New York, has announced that the new Electroglas Flat-Top crystal, available in 144 sizes, 12.0 to 34¾, is meeting with enthusiastic reception on the part of watch case manufacturers, material wholesalers and watchmakers.

According to the manufacturers, the success of the new Flat-Top crystal is in part due to the Electroglas material, an exclusive watch crystal plastic which has gained acceptance for the now-famous Electroglas Lentille.

The FlatTops have the exclusive Electroglas waterproof bevel, and are precision-machined for optical clarity and modern styling. They can be inserted with or without the aid of an inserting device.

Electroglas Flat-Top crystals are available in cabinet assortments ranging from 48 to 144 sizes, in combinations of one, two, or three each, for as little as $8.15. Suggested resale price for the Flat-Top crystals alone is $3.00 per dozen. All Electroglas products are available through recognized watch material wholesalers only.

Electro Seal Watch Crystal Co. is located at 43 West 47th St., N. Y. C.

RECEIVE JAPANESE HONOR

William O. Smith Sr. (right) and William O. Smith Jr. (left), producers of the Esembl-O-Graf Library, were recently elected to honorary membership in the Japanese Society of Chronometry for their service in the establishment of the Society's horological branch library, which was named after them. Earl T. Strickler (center), secretary of the National Association of Watch & Clock Collectors, was delegated to confer the awards to the Smiths in Pittsburgh, Pa., last January 17.

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Helpful Hints on Watch Repairing. 64 page book; 100 illustrations. 75c per copy. Dean Company, Box 3218, Daytona Beach, Florida.

Watchmakers Journal contains instructive articles for watchmakers, students and collectors. $1.00 year. Sample copy 20c. Dean Company, Box 3218, Daytona Beach, Florida.

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Advertisers Index

A

Acon Watch Crown Co..... 83
American Horologist & Jeweler Book Department 14
American Time Products, Inc. 90
Aristo Import Co., Inc..... 75

B

Bausch & Lomb Optical Co. 5
Bonded Messenger Service.. 6
Bowman Technical School.. 58
Bradley University 75
Burt, Edwin B..... 60

C

Clock Makers Guild of America 77

E

Elgin Watchmakers College 1

F

Fulcrum Oil Co..... 35

G

Glarden Importing Co..... 61

H

H.v.H. Tool & Instrument Co. 69
Hairspring Vibrating Co. 73, 79, 83
Hammel, Riglander & Co., Inc..... 27
Hoover & Strong, Inc.....63, 71, 77, 79, 81, 83

I

International Dial Co. Inc. 2

J

Jacoby-Bender, Inc.....29, 30, 31, 32, 33, 34
Jadow, B., Inc.....7, 25, 45
Joseph Brothers 79

K

K.B.F. Distributing Co..... 81
Kerswill Watch Co., Inc..... 65

L

L & R Manufacturing Co..... 23
Lampert, M. J. & Sons, Inc.....55, 63, 67, 71
Larsen Importing Co..... 69
Levin, Louis & Son, Inc..... 39
Lowe, B. Company.....78, 83

Mc

McCaw, William S. Co..... 77

M

Mark-Nelson Watch Co..... 81
Marshall, C. & E. Co.....50, 51
Michigan Dial Refinishing Co. 73
Midwest Wholesale Co..... 83
Modern Technical Supply Co. 71

N

Newall Manufacturing Co.....47, 73, 77, 79
New Hermes Engraving Machine Corp. 13
Nye, William F., Inc..... 53

P

Paulson, Henry & Co..... 77
Poltock, John A. & Co.....61, 71
Presco Watch Crystal Co..... 58

R

Reid, Burton M. Sons, Inc... 65
Ressel Watch Co..... 49
Royal Dial & Refinishing Co. 49
Rubin & Co..... 43

S

Schneider, Carl 75
Sietz, Pierre 8
Silbert, M. J. & Co..... 19
Sobel, Henry & Co., Inc..... 3
Standard Unbreakable Watch Crystals, Inc..... 89
Star-Brite Manufacturing Co..... 81
Swigart, E. & J. Co..... 37
Swiss Federation of Watch Manufacturers.....9, 10, 11, 12

T

Terwilliger, Charles..... 67

W

Wakmann Watch Co., Inc.....15, 73

Z

Zenith Manufacturing & Chemical Corp..... 67

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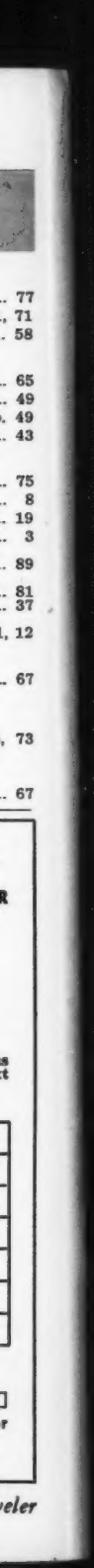

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